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ABSTRACT

This manual is intended to provide students, teachers, counselors, and other school personnel with a set of practical instruments and procedures designed to measure the generalizable mathematics skills of students in secondary vocational programs. Three types of assessment instruments and procedures are presented and discussed: (1) student self-ratings, (2) teacher ratings, and (3) performance tests. The manual is organized around five major sections. The first section describes the list of generalizable mathematics skill areas and skills. The second, third, and fourth sections describe the student self-rating instrument, teacher rating instrument, and performance test, respectively. These three sections provide information regarding the assessment procedures, including instrument development, item analysis, reliability, validity, administration, scoring, and uses. The fifth section describes how the student self-ratings and teacher ratings can be used in combination with the performance test assessment instrument and how the scores may be used and interpreted. The appendixes present the list of generalizable skills color charts; additional important mathematics skills; the student self-rating, teacher rating, and performance test instruments; skill profiles; and the performance test answer key. The information contained in this manual and the information obtained from the assessments can be used in individualized and group planning, assessment, curriculum development, instruction, and evaluation activities. (KC)

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Generalizable Mathematics Skills Assessment

User Manual

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Purpose of the User Manual

The major purpose of the User Manual is to provide students, teachers, counselors, and other school personnel with a set of practical instruments and procedures designed to measure the generalizable mathematics skills of students in secondary vocational programs. Three types of assessment instruments and procedures were developed, and are presented and discussed: (a) Student Self-Ratings, (b) Teacher Ratings, and (c) Performance Test.

The User Manual is organized around five major sections: The first section describes the list of generalizable mathematics skill areas and skills. The second, third, and fourth sections describe the Student Self-Ratings Instrument, Teacher Ratings Instrument, and Performance Test, respectively. These three sections provide information regarding the assessment procedures that include: (a) instrument development, (b) item analysis, (c) reliability, (d) validity, (e) administration, (f) scoring, and (g) uses. The fifth section describes how the Student Self-Ratings and Teacher Ratings can be used in combination with the Performance Test assessment instrument and how the scores may be used and interpreted. Further, the appendices present the list of generalizable skills color charts, additional important mathematics skills, Student Self-Ratings, Teacher Ratings, Performance Test, Skill Profiles, and Performance Test Answer Key.

The generalizable mathematics skills assessment instruments, strategies, and procedures may be used for identifying the functional learning abilities and problems of students having difficulty in successfully completing vocational programs. After identifying students' mathematics skill levels, teachers will have a basis on which to present and deliver the instructional, remedial, and support services necessary for students to succeed in their chosen programs. The assessment instruments are not intended as screening devices for admission or exclusion purposes, but are intended for diagnostic and prescriptive purposes. The information contained in the User Manual and the information obtained from the assessments can be used in individualized and group planning, assessment, curriculum development, instruction, and evaluation activities.

Generalizable Mathematics Skills

The generalizable mathematics skills identified and validated in the secondary vocational programs and occupations in the State of Illinois were used as a basis for developing the assessment strategies and procedures contained in this User Manual. A generalizable mathematics skill is a skill which is basic to, necessary for success in, and transferable (or common) within and/or across vocational programs. The entire report or executive summary describing the skills may be obtained from the Illinois State Board of Education/Department of Adult, Vocational, and Technical Education and is entitled, "Identification of Generalizable Skills in Secondary Vocational Programs."

The mathematics skills identified as generalizable within and across agricultural; business, marketing, and management; health; home economics; and industrial occupations programs are illustrated in the color charts contained in Appendix A. Five categories of generalizable mathematics skills were identified and include: (a) Whole Numbers (5 skills), (b) Fractions (4 skills), (c) Decimals (6 skills), (d) Percent (2 skills), (e) Mixed Operations (4 skills), (f) Measurement and Calculation (6 skills), and (g) Estimation (1 skill).

In addition, several mathematics skills (See Appendix B) were identified as important but not necessarily generalizable in various individual vocational programs. Some of these skills (e.g., algebra, geometry, trigonometry) are the "higher order" mathematics skills. While similar skills may not be generalizable across vocational programs, they are frequently important for success in various programs and occupations. Further, proficiency and mastery in the generalizable mathematics skills are usually prerequisite to acquisition of the "higher order" mathematics skills. The focus of this User

Manual, therefore, is on strategies and procedures for assessing generalizable mathematics skills in secondary vocational programs.

Student Self-Ratings

Instrument Development

The purpose of the generalizable mathematics skills Student Self-Ratings assessment instrument (See Appendix C) is to assess how well students can perceive or estimate their own generalizable mathematics skills. The generalizable mathematics skills listed in Appendix A were used as a basis for systematically developing the Student Self-Ratings assessment instrument. The skills were identified through a combination of literature reviews, curriculum analysis, employer/worker reviews and surveys, teacher reviews and surveys, and other data sources.

Each of the generalizable mathematics skills was translated into 7 scales and 28 instrument items and includes: (a) Whole Numbers Scale (5 items), (b) Fractions Scale (4 items), (c) Decimals Scale (6 items), (d) Percent Scale (2 items), (e) Mixed Operations Scale (4 items), (f) Measurement and Calculation Scale (6 items), and (g) Estimation Scale (1 item). Several items in the Student Self-Ratings contain examples to clarify the skills. A four-point Likert scale based on "degree of skill" is used to measure each skill and includes: (a) "I" Cannot Do, (b) "2" Cannot Do Too Well, (c) "3" Can Do Fairly Well, and (d) "4" Can Do Well. Directions and an example are provided to assist students in using the instrument.

Several drafts of the Student Self-Ratings were developed and reviewed by a panel of experts which included teachers, students, administrators, teacher educators, and researchers. The panel's input regarding content, design, meaning, clarity, and readability was used in producing subsequent revisions of the Student Self-Ratings. The instrument was also pilot tested on a random sample of students in selected secondary vocational programs. Based on the collective feedback from the panel of experts and information/

data collected from the pilot testing, the final version of the Generalizable Mathematics Skills Student Self-Ratings Assessment instrument was produced. The Student Self-Ratings was then considered to possess a sufficient degree of content and face validity. Extensive field testing was conducted to estimate the reliability and further validate the Student Self-Ratings.

Reliability

Reliability is concerned with the extent to which a measuring instrument is capable of producing measures that are internally consistent, precise, and stable. The reliability of the Student Self-Ratings was estimated by internal consistency reliability and test-retest reliability.

Internal Consistency Reliability

The internal consistency reliability of the total Student Self-Ratings instrument is .96 (Cronbach's Coefficient Alpha). This value indicates that the instrument is highly internally consistent and is measuring a uniform or single construct of generalizable mathematics skills. For fifteen vocational programs (Conservation; Agricultural Mechanics; Horticulture; Secretarial; Data Processing; Computer Programming; Nurse Aide; Practical Nursing; Health Occupations Cooperative Education; Food Service, Production, and Management; Child Care; Child Development; Construction and Building Trades; Electronics; Machinist) the reliability coefficients range from .85 to .98. The coefficient for males is .94 and for females is .97. The Student Self-Ratings are also highly internally consistent for students with different levels of mathematics aptitude as measured by the Generalizable Mathematics Skills Performance Test (high: .94, medium: .96, low: .98). In addition, the individual and total coefficients are generally in the high .80 to .95 range. The data indicate that the Generalizable Mathematics Skills Student

Self-Ratings Assessment instrument possesses high internal consistency and is a reliable measure for different vocational programs, males and females, and students who have high, average, or low mathematics aptitude.

Test-Retest Reliability

The test-retest reliability of the total Student Self-Ratings instrument is .81 (Pearson Product-Moment Correlation Coefficient (r)). This correlation indicates that the Student Self-Ratings instrument re-administered over time (14 days) to the same students produces similar results, and is, therefore capable of producing stable measures. The test-retest reliability coefficients for 15 vocational programs generally range from .70 to .99. The coefficients for males is .72 and for females is .88. The Student Self-Ratings are also stable for students with different levels of mathematics aptitude (high: .86, average: .67, low: .97). In addition, the individual and total scale coefficients are generally in the .67 to .99 range. Most of the correlations are significant at the $p < .05.$, $p < .01.$, and/or $p < .001.$ level of significance. The test-retest reliability data indicate that the Generalizable Mathematics Skills Student Self-Ratings Assessment instrument possesses an acceptable level of test-retest reliability and is a moderate to high stable measure for different vocational programs, males and females, and students who have high, average, or low mathematics aptitude.

Validity

Validity is concerned with the extent to which an instrument actually measures what it intends to measure. Evidence of validity is frequently obtained through content analysis and judgments by instrument users as was described in the instrument development section. Validity information about a measuring instrument may also be obtained through comparisons with other similar tests or criterion measures, analysis of particular psychological traits, or other procedures. In addition to content and face validity, the Student Self-Ratings instrument was examined regarding evidence of construct validity.

Construct Validity

The construct validity of a measurement instrument is generally concerned with determining what psychological trait(s) the instrument is actually measuring. If the Student Self-Ratings have evidence of construct validity, they should produce results which agree or are consistent with the Performance Test for different vocational programs, males and females, and students who have high, average, and low levels of mathematics aptitude.

The correlation (r) between the total Generalizable Mathematics Skills Student Self-Ratings and Performance Test is .40. This coefficient indicates that there is a moderate relationship or agreement between the Student Self-Ratings and Performance Test. The correlations between the Student Self-Ratings and Performance Test for 15 vocational programs range from -.24 to .67. The coefficients for males is .20 and for females is .49. The correlations for students with different levels of mathematics aptitude are: (a) high: .40, (b) average: .15, and (c) low: -.17. In addition, the individual and total scale coefficients are generally in the .17 to .72 range, although most coefficients are below .60. Several of the correlations were significant at the $\underline{p} < .05.$, $\underline{p} < .01.$, and/or $\underline{p} < .001.$ level of significance.

While the Student Self-Ratings are highly reliable measures in terms of internal consistency and stability, they have a low to moderate relationship or agreement with the Performance Test. The data suggest that the Student Self-Ratings are probably detecting student characteristics or variables other than vocational programs, gender, or level of mathematics aptitude. For example, the Student Self-Ratings may reflect, in some cases, students' self-esteem or self-image. Therefore, some students may be underestimating their skills while other students may be overestimating their skills relative to their scores on the Performance Test. The Student Self-Ratings may also be detecting other similar psychological variables. Therefore, when using the Student Self-Ratings, school personnel should be aware that an individual student's ratings may be somewhat higher or lower than his/her actual score on the Performance Test.

Administration

A brief explanation by the teacher or other appropriate school personnel as to the purpose of the Student Self-Ratings assessment instrument, may help the student to maintain interest and motivation for completing the Ratings. The Ratings may be administered to individual students or to a group of students.

Each student is provided a Student Self-Ratings instrument that includes directions and an example for completing the Ratings. On the first page of the Ratings, the student should write his/her name, write his/her teacher's name, write the name of his/her school, check (√) his/her vocational program area, and write the name of his/her vocational program. Students are then directed to "Indicate, by circling the number, how well you believe you can do each of the following mathematics skills." It is important that students understand they are only to rate how well they believe they can do each of the skills, and not to actually "perform" the skills. At the end of the Ratings, in the spaces provided, students may also write comments about their mathematics skills.

Students should be permitted as much time as is necessary to complete the Student Self-Ratings. The administrator (e.g., teacher, counselor) of the Ratings may decide to stop the assessment at a logical point (e.g., at the end of a scale) and continue at a later time. Students should understand that the results of the Student Self-Ratings instrument will not affect their admission to or participation in a vocational program or class.

Scoring

The Generalizable Mathematics Skills Assessment Student Self-Ratings instrument may be scored and the results interpreted for individual skills, for scales, and/or for the total instrument (i.e., all 7 scales and 28 skills).

Individual Skills

If the ratings are interpreted for each individual skill, each descriptor (i.e., "Cannot Do," "Cannot Do Too Well," "Can Do Fairly Well," "Can Do Well") may describe a student's self-reported skill level. For example, a rating of "4" or "Can Do Well" on a specific skill, may indicate a high level of skill proficiency--assuming no overestimation--(see pages 31 and 32) for an individual student; thus, no major learning problem may exist, and specific learning prescriptions (e.g., additional instruction) or support services may not be necessary. Conversely, a rating of "1" or "Cannot Do" may likely suggest that a low skill level exists--assuming no underestimation--(see page 32) and that learning prescriptions including remedial or support services are probably needed for an individual student.

A rating of "2" or "Cannot Do Too Well" may indicate that perhaps some (i.e., average) skill proficiency is present but the student may encounter problems at different stages of making calculations or solving word problems. In such cases, the learning prescription needs to focus on those specific areas in which students are having difficulty and correct them accordingly. A rating of "3" or "Can Do Fairly Well" (i.e., average skill proficiency) most likely indicates that in many situations a student can perform a skill but may have difficulty at times during different stages of making calculations and problem solving. Similarly, a learning prescription should focus on those areas causing some difficulty for students. Scoring and interpreting individual skills probably is most useful for diagnosing specific functional learning problems, and for subsequently prescribing the needed support services or additional work necessary for attaining increased skill proficiency.

Scales and Total Instrument

The Student Self-Ratings may also be scored and interpreted by individual scales or by the total instrument. An overall indication of skill proficiency can be obtained and may include: (a) 1-1.99 average rating; low skill proficiency, (b) 2.00-2.99 average rating; average skill proficiency, and (c) 3.00-4.00 average rating; high skill proficiency. For example, a 3.5 average skill rating on a scale (e.g., whole numbers scale, skills 1-5) or the total instrument (all 7 scales and 28 skills) may indicate a moderately high self-report of skill proficiency. Minimal, if any, additional instructional or support services may be needed for an individual student to attain the mathematics skills required for success in his/her vocational program. An average skill rating of 1.5, however, probably would suggest that additional instruction, remedial, and/or support services are necessary for assisting a student to attain the required skill levels.

It should also be noted again that an individual student's Self-Ratings on specific skills and scales, or the total instrument, may be somewhat overestimated or underestimated relative to his/her score on the Generalizable Mathematics Skills Performance Test. However, as students use the Student Self-Ratings more frequently, they should become increasingly familiar with the mathematics skills requirements of their vocational programs. In addition, using the Student Self-Ratings should allow students to become more knowledgeable about their learning strengths and functional learning problems, and become self-directed in the assessment and learning process. Further, for students who underestimate or overestimate their generalizable mathematics skills, use of the Student Self-Ratings should assist their self-reports to become consistent with their actual performance (scores).

The teacher may use the "Skill Profile" provided with the Student Self-Ratings instrument (see Appendix C). The Ratings may be transferred from the instrument to the "Skill Profile" when developing and maintaining progress reports/records for students. The "Skill Profile" may serve as a reference useful in individualized instructional planning.

Uses

The Generalizable Mathematics Skills Assessment Student Self-Ratings instrument, as stated previously, has potential for allowing students to become more familiar with the mathematics skills requirements of their programs and become more cognizant of their learning strengths and functional learning problems. The Ratings could also assist students to become more self-directed in the learning and decision-making processes. The Student Self-Ratings could, therefore, be useful throughout a student's vocational course or program.

The Student Self-Ratings could be administered during the first week of classes (daily if necessary) and every week (formative assessment) thereafter, as well as at the end of the course or program to provide summative information about student skill proficiencies. Teachers or other school personnel should plan for and use the Self-Ratings as frequently as necessary, based on individual student needs.

The information and interpretation of the Ratings should be helpful not only in assessment activities but also for instructional planning, curriculum development, instructional delivery, and evaluation. For example, the information obtained on individual students may assist in developing individualized vocational/career plans. The assessment information obtained can help in writing instructional objectives, planning activities, and designing appropriate evaluation methods. Based on the assessment data obtained, the teacher can develop curriculum by identifying those necessary generalizable mathematics skills that need to be taught through infusion in vocational instruction, separate courses, or remedial and support services. The teacher may also use the Student Self-Ratings assessment information for revising, modifying, or improving his/her instructional delivery techniques for individual students.

The teacher may choose between or use a combination of the Student Self-Ratings, Teacher Ratings, and Performance Test for assessing a student's generalizable mathematics skill levels. Each instrument, which is designed to measure the same generalizable mathematics skills, provides unique input about student skill proficiencies by using different strategies.

In summary, the Student Self-Ratings have several uses which may include:

- Creating an awareness in the student of the mathematics skills requirements of his/her vocational program.
- Permitting the student to become actively involved in the assessment process.
- Providing formative and summative assessment information about a student's learning strengths and functional learning problems.
- Assisting the student in becoming self-directed in the learning and decision-making processes.
- Aiding in instructional planning, curriculum development, instructional delivery, and evaluation activities.

- Providing information useful for developing individualized vocational/career programs.

Teacher Ratings

Instrument Development

The purpose of the Generalizable Mathematics Skills Teacher Ratings Assessment instrument (See Appendix D) is to assess how well teachers can perceive or estimate their students' generalizable mathematics skills. The same scales, skills, items, and procedures used to develop the Student Self-Ratings instrument were used to develop the Teacher Ratings instrument. The format and content of the Teacher Ratings were identical to the Student Self-Ratings, except for the directions which were directed toward teachers.

Several drafts of the Teacher Ratings were developed and reviewed by a panel of experts which included teachers, administrators, teacher educators, and researchers. The panel's input regarding content, design, meaning, clarity, and readability was used in producing the revisions of the Teacher Ratings instrument. The instrument was also pilot tested on a random sample of teachers in selected secondary vocational programs. Based on the collective feedback from the panel of experts and information/data from the pilot testing, the final version of the Generalizable Mathematics Skills Teacher Ratings was produced. The Teacher Ratings was then considered to possess a sufficient degree of content and face validity. Extensive field testing was conducted to estimate the reliability and further validate the Teacher Ratings.

Reliability

Internal Consistency Reliability

The internal consistency reliability of the total Teacher Ratings instrument is .99 (Cronbach's Coefficient Alpha). This value indicates that the instrument is highly internally consistent and is measuring a uniform or single construct of generalizable mathematics skills. For 15 vocational programs the reliability coefficients range from .97 to 1.00. The coefficients for males and for females is .99. The Teacher Ratings are also highly internally consistent for students with different levels of mathematics aptitude as measured by the Generalizable Mathematics Skills Performance Test (high: .98, average: .98, low: .99). In addition, the individual and total coefficients were generally in the .90 to 1.00 range. The data indicate that the Generalizable Mathematics Skills Teacher Ratings Assessment instrument possesses high internal consistency and is a reliable measure for different vocational programs, males and females, and students who have high, average, or low mathematics aptitude.

Test-Retest Reliability

The test-retest reliability of the total Teacher Ratings instrument is r = .83. This correlation indicates that the Teacher Ratings instrument re-administered over time (14 days) to the same teachers is capable of producing stable measures. The test-retest reliability coefficients for 15 vocational programs generally range from .44 to .99. The coefficients for males is .86 and for females is .80. The Teacher Ratings are also stable for students with different levels of mathematics aptitude (high: .83, average: .76, low: .88). In addition, the individual and total scale coefficients are generally in the .50 to 1.00 range. Most of the correlations are significant at the $\underline{p} < .05$, $\underline{p} < .01$, and or $\underline{p} < .001$. level of significance. The test-retest reliability data indicate that the Generalizable Mathematics Skills Teacher Ratings Assessment instrument generally possesses an acceptable level of test-retest reliability and is a moderate to high stable measure for different vocational programs, males and females, and students who have high, average, or low mathematics aptitude.

Validity

Construct Validity

The correlation (r) between the total Generalizable Mathematics Skills Teacher Ratings and the Performance Test is .53. This coefficient indicates that there is a moderate relationship or agreement between the Teacher Ratings and Performance Test. The correlations between the Teacher Ratings and Performance Test for 15 vocational programs range from -.21 to .78. The coefficients for males is .46 and for females is .57. The correlations for students with different levels of mathematics aptitude are: (a) high .49, (b) average .35, and (c) low -.48. In addition, the individual and total scale coefficients are generally in the .27 to .81 range, although most coefficients are below .50. Several of the correlations were significant at the $p < .05$, $p < .01$, and/or $p < .001$. level of significance.

While the Teacher Ratings are highly reliable measures in terms of internal consistency and stability, they have a low to moderate relationship or agreement with the Performance Test. The data suggest that the Teacher Ratings, similar to the Student Self-Ratings, are probably detecting student characteristics or variables other than vocational programs, gender, or level of mathematics aptitude. For example, some teachers may be underestimating their students' skills while other teachers may be overestimating their students' skills relative to scores on the Performance Test. The Teacher Ratings may also be detecting other psychological variables. Therefore, when using the Teacher Ratings, school personnel should be aware that an individual teacher's ratings of his/her students may be somewhat higher or lower than the students' actual scores on the Performance Test.

Administration

One Teacher Ratings instrument is to be used for each student who is being assessed at a given time. The Teacher Ratings include directions and an example for completing the Ratings. On the first page of the Ratings, the teacher may write his/her student's name, write his/her name, write the name of his/her school, check (√) his/ her vocational program area, and write the name of his/her vocational program. Teachers are then directed to "Indicate, by circling the number, how well you believe the student named on the cover sheet can do each of the following mathematics skills." At the end of the Ratings, in the spaces provided, teachers may also write comments about their students' mathematics skills.

Teachers should use as much time as is necessary to complete the Ratings for each student. The teacher may decide to stop the assessment at a logical point (e.g., at the end of a scale) and continue at a later time. Teachers should not use the results of the Teacher Ratings instrument to affect a student's admission to or participation in a vocational program or class.

Scoring

The Generalizable Mathematics Skills Assessment Teacher Ratings instrument, similar to the Student Self-Ratings instrument, may be scored and the results interpreted for individual skills, for scales, and/or for the total instrument (i.e., all 7 scales and 28 skills).

Individual Skills

If the Ratings are interpreted for each individual skill, each descriptor (i.e., "Cannot Do," Cannot Do Too Well," "Can Do Fairly Well," "Can Do Well") may describe a teacher's report of a student's skill level. For example, a rating of "4" or "Can Do Well" on a specific skill may indicate a high level of skill proficiency--assuming no overestimation--(see pages 31 and 32) for an individual student. Thus, no major learning problem may exist, and specific learning prescriptions (e.g., additional instruction) or support services may not be necessary. Conversely, a rating of "1" or "Cannot Do" may likely suggest that a low skill level exists (assuming no underestimation; see page 32) and that learning prescriptions including remedial or support services are probably needed for an individual student.

A rating of "2" or "Cannot Do Too Well" may indicate that perhaps some (i.e., average) skill proficiency is present but the student may encounter problems at different stages of making calculations or solving word problems. In such cases, the learning prescription needs to focus on those specific areas in which students are having difficulty and correct them accordingly. A rating of "3" or "Can Do Fairly Well" (i.e., average skill proficiency) most likely indicates that in many situations a student can perform a skill but may have difficulty at times during different stages of making calculations and problem solving. Similarly, a learning prescription should focus on those areas causing some difficulty for students. Scoring and interpreting individual skills probably is most useful for diagnosing specific functional learning problems, and for subsequently prescribing the needed support services or additional work necessary for attaining increased skill proficiency.

Scales and Total Instrument

The Teacher Ratings may also be scored and interpreted by individual scales or by the total instrument. An overall indication of skill proficiency can be obtained and may include: (a) 1-1.99 average rating; low skill proficiency, (b) 2.00-2.99 average rating; average skill proficiency, and (c) 3.00-4.00 average rating; high skill proficiency. For example, a 3.5 average skill rating on a scale (e.g., whole numbers scale, skills 1-5) or the total instrument (all 7 scales and 28 skills) may indicate a moderately high report of skill proficiency. Minimal, if any, additional instructional or support services may be needed for an individual student to attain the mathematics skills required for success in his/her vocational program. An average skill rating of 1.5, however, probably would suggest that additional instruction, remedial, and/or support services are necessary for assisting a student to attain required skill levels.

It should also be noted again that an individual teacher's ratings on specific skills and scales, or the total instrument, may be somewhat overestimated or underestimated relative to his/her students' scores on the Generalizable Mathematics Skills Performance Test. However, as teachers use the Teacher Ratings more frequently, they should become more knowledgeable about their students' learning strengths and functional learning problems. Further, for teachers who underestimate or overestimate their students' generalizable mathematics skills, use of the Teacher Ratings should assist their reports to become consistent with their students' actual performance (scores).

The teacher may use the "Skill Profile" provided with the Teacher Ratings instrument (see Appendix D). The Ratings may be transferred from the instrument to the "Skill Profile" when developing and maintaining progress reports/records for students. The "Skill Profile" may serve as a reference useful in individualized instructional planning.

Uses

The Generalizable Mathematics Skills Assessment Teacher Ratings instrument, as stated previously, has potential for allowing teachers to become more familiar with the learning strengths and functional learning problems of students in their vocational programs. The Teacher Ratings could, therefore, be useful throughout a student's vocational course or program.

The Teacher Ratings could be administered during the first week of classes (daily if necessary) and every week (formative assessment) thereafter, as well as at the end of the course or program to provide summative information about student skill proficiencies. Teachers or other school personnel should plan for and use the Teacher Ratings as frequently as necessary, based on individual student needs.

The information and interpretation of the Ratings should be helpful not only in assessment activities but also for instructional planning, curriculum development, instructional delivery, and evaluation. For example, the information obtained on individual students may assist in developing individualized vocational/career plans. The assessment information obtained can help in writing instructional objectives, planning activities, and designing appropriate evaluation methods. Based on the assessment data obtained, the teacher can develop curriculum by identifying those necessary generalizable mathematics skills that need to be taught through infusion in vocational instruction, separate courses, or remedial and support services. The teacher may also use the Student Self-Ratings Assessment information for revising, modifying, or improving his/her instructional delivery techniques for individual students.

The teacher may choose between or use a combination of the Teacher Ratings, Student Self-Ratings, and Performance Test for assessing a student's generalizable mathematics skill levels. Each instrument, which is designed to measure the same generalizable mathematics skills, provides unique input about student skill proficiencies by using different strategies.

In summary, the Teacher Ratings have several uses which may include:

- Creating an increased awareness in the teacher of the mathematics skills requirements of his/her vocational program.
- Permitting the teacher to become more directly involved in the assessment process.
- Providing formative and summative assessment information about a student's learning strengths and functional learning problems.
- Aiding in instructional planning, curriculum development, instructional delivery, and evaluation activities.
- Providing information useful for developing individualized vocational/career programs.

Performance Test

Instrument Development

The purpose of the Generalizable Mathematics Skills Performance Test Assessment instrument (See Appendix E) is to assess how well students can perform generalizable mathematics skills as measured by a performance test. The same scales, skills, items, and procedures used to develop the Student Self-Ratings and Teacher Ratings instruments were used to develop the Performance Test instrument. However, the design, format, and nature of the item content was different from the Student Self-Ratings and Teacher Ratings.

Each of the generalizable mathematics skills were translated into 7 scales and 150 instrument items and included: (a) Whole Numbers Scale (25 items), (b) Fractions Scale (34 items), (c) Decimals Scale (43 items), (d) Percent Scale (9 items), (e) Mixed Operations Scale (15 items), (f) Measurement and Calculation Scale (20 items) and (g) Estimation Scale (4 items). A three-distractor multiple-choice format is used to measure each skill. Directions and an example are provided to assist students in using the instrument.

Several drafts of the Performance Test were developed and reviewed by a panel of experts which included teachers, students, administrators, teacher educators, and researchers. The panel's input regarding content, design, meaning, clarity, and readability was used in producing the revisions of the Performance Test. The instrument was also pilot tested on a random sample of students in selected vocational programs. Based on the collective feedback from the panel of experts and information/data from the pilot testing, the final version of the Generalizable Mathematics Skills Performance Test Assessment instrument was produced. The performance test was then considered to possess a sufficient degree of content and face validity. Extensive field testing was conducted to estimate the reliability and further validate the Performance Test. The Performance Test Answer Key is provided in Appendix F.

Item Analysis

After extensive field testing, an item analysis was conducted on the Performance Test. The major purpose of the item analysis was to examine each of the 150 items for their degrees of difficulty and discrimination ability. Item difficulty is based on how many persons answer an item correctly. Therefore, if most persons respond correctly to a particular item, that item would be considered an "easy item." Conversely, if few people answer an item correctly, that item would be considered a "difficult item." If approximately one-half of all the persons taking a test answer an item correctly and one-half incorrectly, that item would be considered moderately easy or difficult.

Item discrimination indicates the extent to which a particular item "discriminates" between those persons who score in the upper 50% of scores and those persons who score in the lower 50% of scores. If an item discriminates well, those persons who scored in the upper 50% should answer the item correctly, and those who score in the lower 50% should answer the item incorrectly. If an item does not discriminate well, the reverse is true. Therefore, for each item, the key (right answer) should discriminate positively, and each distractor (wrong answer) should discriminate negatively. In addition, each distractor should have at least some responses.

The item analysis was conducted on the Performance Test for all students, each of 15 vocational programs, males and females, and students who have high, average, and low levels of mathematics aptitude. The analysis indicates that the Performance Test is moderately difficult and discriminates well between those students who score high and those students who score low. In addition, the key and three (3) distractors for each of the 150 items were checked for (a) miskeying (wrong answer), (b) guessing, and (c) ambiguity. The information obtained from the item analysis was used to revise individual items in the Performance Test. Individual items (stems, keys, and distractors) were revised as needed. The Performance Test was then considered to possess a high degree of content and face validity.

Reliability

Internal Consistency Reliability

The internal consistency reliability of the total Performance Test is .97 (Kuder-Richardson -21 (KR-21)). This value indicates that the instrument is very highly internally consistent and is measuring a uniform or single construct of generalizable mathematics skills. The standard error of measurement (SEM) for the total instrument is 4.73. The SEM means that a person's true score on the Performance Test will be ± 4.73 points from his/her obtained score 68% of the time. A person's true score will be ± 9.46 (2 SEMs) points from his/her obtained score 95% of the time, or ± 14.19 (3 SEMs) points 99% of the time. For 15 vocational programs the reliability coefficients range from .90 to .98 and the SEM ranges from 3.78 to 4.86. The coefficients for males and females are .99, and the SEM is 3.97 and 4.02, respectively. The Performance Test is also highly internally consistent for students with different levels of mathematics aptitude as measured by the Performance Test (high: .97, average: .96, low: .95) and the SEMs are 4.32, 4.45 and 4.16, respectively. The data indicate that the Generalizable Mathematics Skills Performance Test Assessment instrument possesses high internal consistency and is a reliable measure for different vocational programs, males and females, and students who have high, average, and low mathematics aptitude.

Test-Retest Reliability

The test-retest reliability of the total Performance Test instrument is r = .65. This correlation is significant at the .001 level of significance and indicates that the Performance Test re-administered over time (14 days) to the same students produces similar results, and is, therefore capable of producing stable measures. The test-retest reliability coefficients for 15 vocational programs generally range from .53 to .99 with most correlations above .85. The coefficients for males is .44 and for females is .79. The correlations for students with different levels of mathematics aptitude are high: .85, average: .50, low: -.26. In addition, the individual and total scale coefficients are generally in the .40 to .99 range with most coefficients above .60. Most of the correlations are significant at the $p < .05.$, $p < .01.$, and/or $p < .001$ level of significance. The test-retest reliability data indicate that the Generalizable Mathematics Skills Performance Test Assessment instrument generally possesses an acceptable level of test-retest reliability and is a moderate to high ,stable measure for different vocational programs, males and females, and students who have high, average, and low mathematics aptitude.

Validity

Construct Validity

The relationship or extent of agreement between the Student Self-Ratings or Teacher Ratings with the Performance Test, as measured by correlation, was low to moderate. The correlations between the Student Self-Ratings and the Performance Test range from .17 to .72, although most coefficients are below .60. The correlations between the Teacher Ratings and the Performance Test range from .27 to .81, although most coefficients are below .50. While the Student Self-Ratings, Teacher Ratings, and Performance Test are highly reliable measures, the Student Self-Ratings and Teacher Ratings are probably detecting psychological variables not detected by the Performance Test. The scores on the Student Self-Ratings and Teacher Ratings, therefore, may be somewhat higher or lower than Performance Test scores for individual students.

Administration

The Performance Test includes directions and an example for completing the Test. On the first page of the Ratings, the student may write his/her name, write his/her teacher's name, write the name of his/her school, check (√) his/her vocational program area, and write the name of his/her vocational program. Students are then directed to "Do each of the following problems by circling the correct answer. Please use the scratch paper provided to work out your answers."

Students should be permitted as much time as is necessary to complete the Performance Test. The administrator (e.g., teacher, counselor) of the Test may decide to stop the assessment at a logical point (i.e., at the end of a scale) and continue at a later time. Students should understand that the results of the Performance Test instrument will not affect their admission to or participation in a vocational program or class.

Scoring

The Generalizable Mathematics Skills Assessment Performance Test instrument may be scored and the results interpreted for individual skills, for scales, and/or for the total instrument (i.e., all 7 scales and 28 skills).

Individual Skills

If the items are interpreted for each skill, correct or incorrect responses provide an indication of skill proficiency. For example, a correct response on a particular item may indicate skill proficiency for an individual student. Thus, no major learning problem may exist, and specific learning prescriptions (e.g., additional instruction) or support services may not be necessary. Conversely, a wrong answer on a particular item indicates a lack of skill proficiency and that learning prescriptions including remedial or support services are probably needed for an individual student. A wrong answer may also suggest that some skill proficiency is present but the student may encounter problems at different stages of making calculations or solving word problems. In such cases, the learning prescription needs to focus on those specific areas in which students are having difficulty and correct them accordingly. Scoring and interpreting individual skills is probably most useful for diagnosing specific functional learning problems, and for subsequently prescribing the needed support services or additional work necessary for attaining increased skill proficiency.

Scales and Total Instrument

The Performance Test also may be scored and interpreted by individual scales or by the total instrument. An overall indication of skill proficiency can be obtained based on raw scores on the total instrument and may include: (a) 0-50; low skill proficiency, (b) 51-100; average skill proficiency, and (c) 101-150; high skill proficiency. For example, a raw score of 38 on the total instrument (all 7 scales and 150 items) indicates a low skill proficiency for a student. Likewise, students who obtain raw scores of 75 and 140 would be considered to have average and high skill proficiency, respectively. A score of 140 on the total instrument probably indicates that minimal, if any, additional instructional or support services are needed for an individual student to attain the mathematics skills required for success in his/her vocational program. However, a score of 75 (average skill proficiency) or 38 (low skill proficiency) strongly suggests that additional instruction and remedial or support services are necessary for assisting a student to attain the required skill levels.

The Performance Test may be scored and results interpreted by individual scales using similar procedures used for the total instrument (see Table 1). For example, the whole numbers scale includes 25 items involving different kinds of skills. Raw scores of 1-8, 9-17, and 18-25 may be interpreted as low, average, and high skill proficiencies for individual students, respectively. The teacher should focus on those items the student answers incorrectly and prescribe the necessary additional instruction and remedial or support services, accordingly.

The teacher may use the "Skill Profile" provided with the Performance Test instrument (See Appendix E). The Test scores may be transferred from the instrument to the "Skill Profile" when developing and maintaining progress reports/records for students. The "Skill Profile" may serve as a reference useful in individualized instructional planning.

Uses

The Generalizable Mathematics Skills Assessment Performance Test Instrument has potential for allowing students to become more familiar with the mathematics skills requirements of their programs and become more cognizant of their learning strengths and functional learning problems. The Performance Test could be useful throughout a student's vocational course or program.

The Performance Test could be administered during the first week of classes (daily if necessary) and every week (formative assessment) thereafter, as well as at the end of the course or program to provide summative information about student skill proficiencies. Teachers or other school personnel should plan for and use the Performance Test as frequently as necessary, based on individual student needs.

The information and interpretation of the Performance Test information should be helpful not only in assessment activities but also for instructional planning, curriculum development, instructional delivery, and evaluation. For example, the information obtained on individual students may assist in developing individualized vocational/career plans. The assessment information obtained can help in writing instructional objectives, planning activities, and designing appropriate evaluation methods. Based on the assessment data obtained, the teacher can develop curriculum by identifying those necessary generalizable mathematics skills that need to be taught through infusion in vocational instruction, separate courses, or remedial and support services. The teacher may also use the Performance Test assessment information for revising, modifying, or improving his/her instructional delivery techniques for individual students.

The teacher may choose between or use a combination of the Performance Test, Student Self-Ratings, and Teacher Ratings for assessing a student's generalizable mathematics skill levels. Each instrument, which is designed to measure the same generalizable mathematics skills provides unique input about student skill proficiencies by using different strategies.

In summary, the Performance Test has several uses which may include:

- Creating an awareness in students and teachers of the mathematics skills requirements of their vocational programs.
- Providing formative and summative assessment information about a student's learning strengths and functional learning problems.
- Aiding in instructional planning, curriculum development, instructional delivery, and evaluation activities.
- Providing information useful for developing individualized vocational/career programs.

Use of the Student Self-Ratings and Teacher Ratings With the Performance Test Assessment Instrument

The previous sections discussed the development, reliability, validity, administration, scoring, and uses of the Student Self-Ratings, Teacher Ratings, and Performance Test Assessment instruments. The instruments have similar and unique uses and are designed to measure the same generalizable mathematics skills using different strategies and procedures. This section discusses how the teacher or other school personnel may use the instruments and how the scores may be used and interpreted. The uses are described for individual skills, scales, and the total instruments.

The teacher should examine the color charts in Appendix B when assessing his/her students' mathematics skills by identifying their own programs and those skills which have high generalizability (blue), medium generalizability (yellow), and low generalizability (white). The skills illustrated in blue should receive the most emphasis when using the assessment instruments, while planning curriculum, and when teaching. The teacher may place less emphasis on those skills illustrated in yellow and minimal emphasis might be placed on those skills illustrated in white. Table 1 describes the relationship of the skills listed on the Student Self-Ratings and Teacher Ratings with the items included on the Performance Test. It will assist the teacher in interpreting the Ratings and scores on the Performance Test. The Ratings and Performance Test scores indicate students who possess (a) high skill proficiency, (b) average skill proficiency, and (c) low skill proficiency:

High Skill Proficiency A student possesses an adequate level of generalizable mathematics skills and requires minimal, if any, additional instruction or support/remedial services necessary to succeed in his/her vocational program.

Average Skill Proficiency	A student possesses a marginally adequate level of generalizable mathematics skills and requires a moderate amount of additional instruction and/or support/remedial services necessary to succeed in his/her vocational program.
Low Skill Proficiency	A student possesses an inadequate level of generalizable mathematics skills and requires a considerable amount of additional instruction and/or support/remedial services to succeed in his/her vocational program.

The Student Self-Ratings or Teacher Ratings may be somewhat higher or lower than the scores on the Performance Test for individual students. The Ratings may be either underestimated, overestimated, or consistent with the scores on the Performance Test and are defined as follows:

Underestimation: When a Student Self-Rating or Teacher Rating is at a lower level than a score on the Performance Test (e.g., average Student Self-Rating and a high Performance Test score, low Teacher Rating and an average Performance Test score).

Overestimation: When a Student Self-Rating or Teacher Rating is at a higher level than a score on the Performance Test (e.g., high Student Self-Rating and an average Performance Test score, average Teacher Rating and low Performance Test score).

Consistent: When a Student Self-Rating or Teacher Rating is at the same level as a score on the Performance Test (e.g., high Student Self-Rating and a high Performance Test score, average Teacher Rating and an average Performance Test score, low Student Self-Rating and a low Performance Test score.

These definitions along with Table 1 will be helpful when interpreting the Ratings and Performance Test scores for individual skills, scales, and total instruments.

Table 1

Relationship of the Skills Listed on the Student Self-Ratings and Teacher Ratings with the Items Included on the Performance Test

Student Self-Ratings and Teacher Ratings Skills (Range of Responses)	Performance Test Items (Range of Responses)
4-"Can Do Well" (High) 3-"Can Do Fairly Well" (Average) 2-"Cannot Do Too Well" (Average) 1-"Cannot Do" (Low)	"Correct Items"/ "Incorrect Items"
Whole Numbers	
1. Read, write, and count whole numbers	1-6 (High: 5-6) (Average: 3-4) (Low: 1-2)
2. Add and subtract whole numbers	7-12 (High: 5-6) (Average: 3-4) (Low: 1-2)
3. Multiply and divide whole numbers	13-18 (High: 5-6) (Average: 3-4) (Low: 1-2)
4. Add, subtract, multiply, and divide whole numbers to solve word problems	19-22 (High: 4) (Average: 2-3) (Low: 1)
5. Round off whole numbers	23-25 (High: 3) (Average: 2) (Low: 1)
(High: 3-4.00) (Average: 2-2.99) (Low: 1-1.99)	(High: 18-25) (Average: 9-17) (n=25 items) (Low: 1-8)

Fractions

6. Read and write common fractions	26-31	(High: 5-6) (Average: 3-4) (Low: 1-2)
7. Add and subtract common fractions	32-43	(High: 9-12) (Average: 5-8) (Low: 1-4)
8. Multiply and divide common fractions	44-55	(High: 9-12) (Average: 5-8) (Low: 1-4)
9. Add, subtract, multiply, and divide common fractions to solve word problems	56-59	(High: 4) (Average: 2-3) (Low: 1)
(High: 3-4.00) (Average: 2-2.99) (Low: 1-1.99)		(High: 24-34) (Average: 13-23) (n=34 items) (Low: 1-12)

Decimals

10. Read and write decimals	60-63	(High: 4) (Average: 2-3) (Low: 1)
11. Add and subtract decimals	64-75	(High: 9-12) (Average: 5-8) (Low: 1-4)
12. Multiply and divide decimals	76-87	(High: 9-12) (Average: 5-8) (Low: 1-4)
13. Add, subtract, multiply, and divide common decimals to solve word problems	88-91	(High: 4) (Average: 2-3) (Low: 1)
14. Solve problems involving dollars and cents	92-99	(High: 6-8) (Average: 3-5) (Low: 1-2)
15. Round off decimals	100-102	(High: 3) (Average: 2) (Low: 1)
(High: 3-4.00) (Average: 2-2.99) (Low: 1-1.99)		(High: 30-43) (Average: 16-29) (n=43 items) (Low: 1-15)

Percent

16. Read and write percents	103-108	(High: 5-6) (Average: 3-4) (Low: 1-2)
17. Solve word problems involving percents	109-111	(High: 3) (Average: 2) (Low: 1)
(High: 3-4.00) (Average: 2-2.99) (Low: 1-1.99)		(High: 7-9) (Average: 4-6) (n=9 items) (Low: 1-3)

Mixed Operations

18. Change fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, fractions or mixed numbers to decimal fractions, decimal fractions to fractions or mixed numbers	112-120	(High: 7-9) (Average: 4-6) (Low: 1-3)
19. Solve word problems by selecting and using the correct order of addition, subtraction, multiplication, and division for whole numbers, fractions, decimals, and percents	121-123	(High: 3) (Average: 2) (Low: 1)
20. Find averages (means)	124-126	(High: 3) (Average: 2) (Low: 1)
21. Do written calculations quickly	N/A	
(High: 3-4.00) (Average: 2-2.99) (Low: 1-1.99)		(High: 11-15) (Average: 6-10) (n=15 items) (Low: 1-5)

Measurement and Calculation		
22. Read numbers or symbols from time, weight, distance, and volume measuring scales	127-133	(High: 6-7) (Average: 3-5) (Low: 1-2)
23. Use measuring scales to determine an object's weight, distance, and volume in standard (English) units	N/A	
24. Use measuring scales to determine an object's weight, distance, and volume in metric units	N/A	
25. Do basic metric conversions involving weight, distance, and volume	134-139	(High: 5-6) (Average: 3-4) (Low: 1-2)
26. Solve problems involving time, weight, distance, and volume	140-146	(High: 6-7) (Average: 3-5) (Low: 1-2)
27. Use a calculator to solve problems involving addition, subtraction, multiplication, and division	N/A	
(High: 3-4.00) (Average: 2-2.99) (Low: 1-1.99)		(High: 15-20) (Average: 8-14) (n=20 items) (Low: 1-7)
Estimation		
28. Determine if a solution or answer to a mathematics problem is reasonable	147-150	(High: 4) (Average: 2-3) (Low: 1)
(High: 3-4.00) (Average: 2-2.99) (Low: 1-1.99)		(High: 4) (Average: 2-3) (n=4 items) (Low: 1)
Total Instrument		
(High: 3-4.00) (Average: 2-2.99) (Low: 1-1.99)		(High: 101-150) (Average: 51-100) (n=150 items (Low: 0-50)

Individual Skills

The assessment of individual skills using the Student Self-Ratings, Teacher Ratings, or Performance Test was described previously. Correct or incorrect answers on the Performance Test may be compared to responses on the Student Self-Ratings or Teacher Ratings. The scores on either the Student Self-Rating and/or Teacher Rating instruments may be compared with corresponding Performance Test scores for individual skills. The comparisons relate whether the Student Self-Ratings and/or Teacher Ratings are consistent, overestimated, or underestimated relative to a student's score on the Performance Test for an individual skill. Table 2 and the text which follows it provide examples of how scores on the Student Self-Rating or Teacher Rating instruments can be compared and interpreted with scores on the Performance Test for individual skills.

Table 2
Examples of Comparisons and Interpretations of Student Self-Ratings and Teacher Ratings With Performance Test Scores for An Individual Skill

Skill	Student Self-Rating	Teacher Rating	Performance Test Score
Read, Write, and Count Whole Numbers	4(overestimation)	3(overestimation)	1
	2(overestimation)	1(consistent)	2
	4(consistent)	1(underestimation)	6
	1(underestimation)	2(underestimation)	5
	2(consistent)	4(overestimation)	3
	3(consistent)	3(consistent)	4

If on the "Whole Numbers" Scale, skill #1: Read, Write, and Count Whole Numbers, a rating of "4" or "Can Do Well" was obtained on the Student

Self-Ratings and a score of 1 (1 of 6 items correct) was obtained on the Performance Test for an individual student, this would indicate an overestimation of the student's skill level. The teacher may use the results to assist and counsel the student to better understand his/her learning strengths. A close examination of the Performance Test could help specify student learning strengths and problems.

Conversely, a score of "2" or "Cannot Do Too Well" on the Teacher Ratings and a total score of "5" on items 1-6 on the Performance Test would indicate an underestimation of a student's skill. Similarly, the teacher could examine his/her observations and perceptions of the student to acquire a clearer idea of the student's learning strengths based on the results of the Performance Test.

A score of "3" or "Can Do Fairly Well" on the Student Self-Ratings and a score of "4" on the Performance Test may indicate a relatively accurate and consistent diagnosis of a student's mathematics skill level. The scores on the Student Self-Ratings and Teacher Ratings may be compared with the Performance Test scores and interpreted, similarly, for the other 27 individual skills contained in each of the 7 scales.

Scales

Average scale ratings on the Student Self-Ratings or Teacher Ratings may be compared to scale scores on the Performance Test. The comparisons relate whether the student Self-Ratings or Teacher Ratings are consistent, overestimated, or underestimated relative to a student's score on the Performance Test for an individual scale. Table 3 and the text which follows it provide examples of how average scale scores on the Student Self-Rating or Teacher Rating instruments can be compared and interpreted with scale scores on the Performance Test for individual scales.

Table 3

Examples of Comparisons and Interpretations of Student Self-Ratings and Teacher Ratings With Performance Test Scores for An Individual Scale

Scale	Student Self-Rating	Teacher Rating	Performance Test Score
Fractions	2.65(consistent)	3.44(overestimation)	15
	3.90(overestimation)	2.45(consistent)	22
	2.88(consistent)	2.63(consistent)	20
	3.50(overestimation)	2.78(overestimation)	10
	1.96(underestimation)	2.22(underestimation)	29
	3.24(consistent)	1.80(underestimation)	33

If on the "Fractions" scale (items 6-9), an average rating of 3.90 on the Student Self-Ratings and a score of 22 (22 of 34 items correct) was obtained on the Performance Test "fractions" scale for an individual student, this would indicate an overestimation of a student's skill level. Similar to the case of individual skills, the teacher may use the results to assist and counsel the student to better understand his/her learning strengths.

An average score of 2.22 on the Teacher Ratings and a total scale score of 29 (29 of 32 items correct) obtained on the Performance Test "fractions" scale for an individual student would suggest an underestimation of a student's skill level. The teacher may also examine his/her perception of the student to obtain a better idea of the student's learning strengths. A close examination of the Performance Test results could specify student learning strengths and problems.

An average score of 3.24 on the Student Self-Ratings and a score of 33 (33 of 34 items correct) on the "fractions" scale, on the Performance Test probably would indicate a relatively accurate and consistent diagnosis of a student's skill level. The scores on the Student Self-Ratings and Teacher Ratings may be compared with the Performance Test scores and interpreted, similarly, for the other 6 scales.

Total Instrument

Average ratings on the total Student Self-Ratings or Teacher Ratings may also be compared to total scores on the Performance Test. The comparisons relate whether the average ratings on the total Student Self-Ratings or Teacher Ratings are consistent with, overestimated, or underestimated relative to a student's total score on the Performance Test. Table 4 and the text which follows it provide examples of how average scores on the total Student Self-Rating or Teacher Rating instruments can be compared and interpreted with total scores on the Performance Test.

Table 4

Examples of Comparisons and Interpretations of Total Student Self-Ratings and Teacher Ratings With Total Performance Test Scores

Student Self-Rating	Teacher Rating	Performance Test Score
1.14(consistent)	3.75(overestimation)	22
3.23(overestimation)	2.82(consistent)	76
2.48(overestimation)	3.53(overestimation)	37
3.76(consistent)	3.94(consistent)	138
1.53(underestimation)	2.32(underestimation)	147
2.64(consistent)	1.25(underestimation)	53

If an average rating of 2.48 on the Student Self-Ratings and a score of 37 (37 of 150 items correct on the total instrument) on the Performance Test for an individual student would indicate an overestimation of a student's mathematics skills. The teacher, again, may use the results and counsel the student to better understand and identify his/her learning strengths.

An average score of 2.32 on the total Teacher Ratings and a total instrument score of 147 (147 of 150 items correct) obtained on the Performance Test for an individual student would suggest an underestimation of a student's skills. The teacher could also examine his/her perceptions of the student to obtain a clearer idea of the student's learning strengths. Therefore, a close examination of the Performance Test could identify specific student learning strengths and problems, and suggest the necessary learning prescriptions necessary to increase the student's skill levels.

An average score of 2.64 on the Student Self-Ratings and a score of 53 (53 of 150 items correct on the total instrument) on the Performance Test most likely indicates a relatively accurate and consistent diagnosis of a student's skill level.

Appendices

Appendix A

Generalizable Mathematics Skills

KEY

■ - High Generalizability
($\bar{x}$ = 5.01 - 7.00)

▨ - Medium Generalizability
($\bar{x}$ = 3.00 - 5.00)

□ - Low Generalizability
($\bar{x}$ = 1.00 - 2.99)

Mathematics Skills

Whole Numbers

1. Read, write, and count single and multiple digit whole numbers
2. Add and subtract single and multiple digit whole numbers
3. Multiply and divide single and multiple digit whole numbers
4. Use addition, subtraction, multiplication, and division to solve word problems with single and multiple digit whole numbers
5. Round off single and multiple digit whole numbers

Fractions

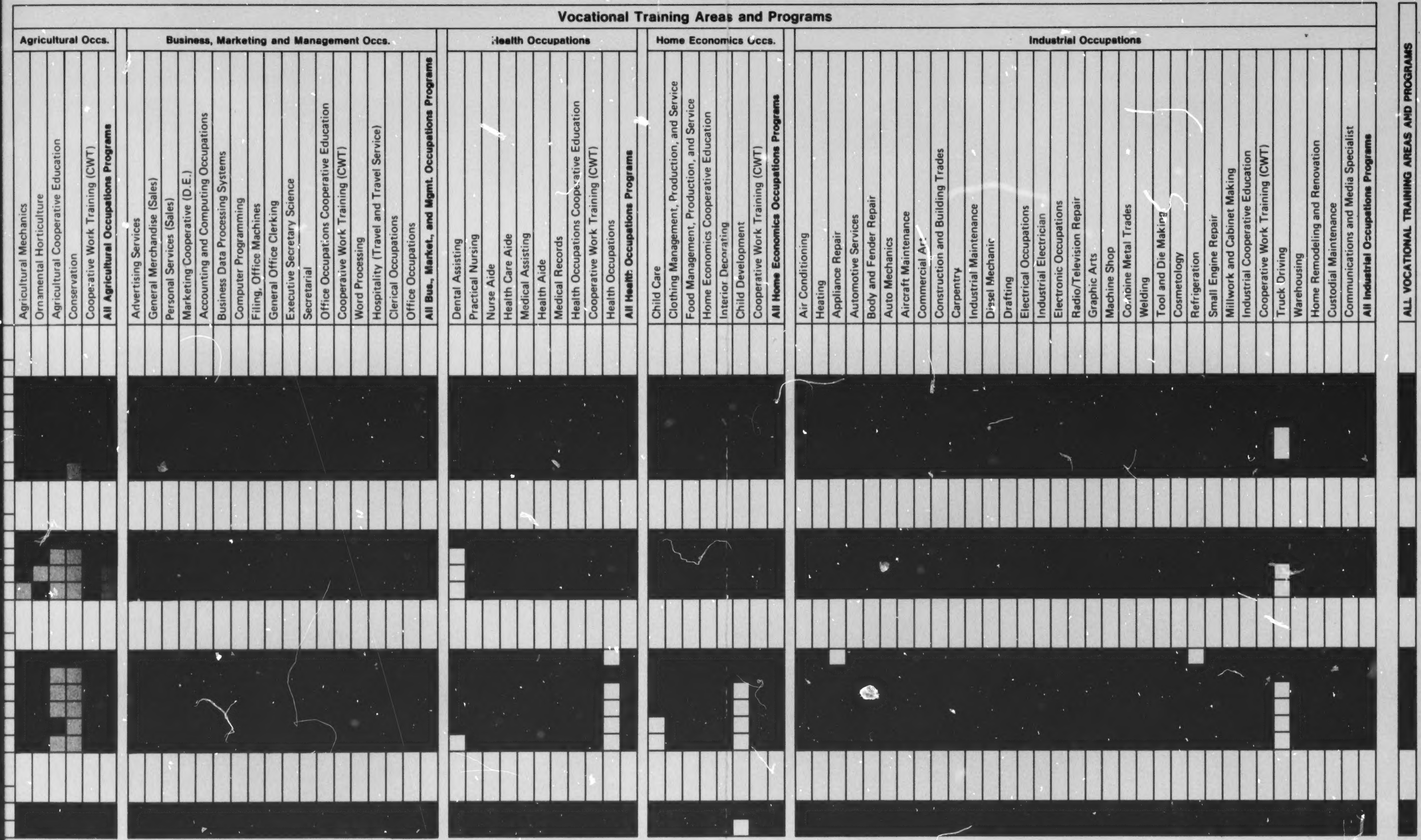
6. Read and write common fractions
7. Add and subtract common fractions
8. Multiply and divide common fractions
9. Solve word problems with common fractions

Decimals

10. Carry out arithmetic computations involving dollars and cents
11. Read and write decimals in one and more places
12. Round off decimals to one or more places
13. Multiply and divide decimals in one or more places
14. Add and subtract decimals in one or more places
15. Solve word problems with decimals in one or more places

Percent

16. Read and write percents
17. Compute percents



Vocational Training Areas and Programs

Agricultural Occs.
- Agricultural Mechanics
- Ornamental Horticulture
- Agricultural Cooperative Education
- Conservation
- Cooperative Work Training (CWT)
- **All Agricultural Occupations Programs**

Business, Marketing and Management Occs.
- Advertising Services
- General Merchandise (Sales)
- Personal Services (Sales)
- Marketing Cooperative (D.E.)
- Accounting and Computing Occupations
- Business Data Processing Systems
- Computer Programming
- Filing, Office Machines
- General Office Clerking
- Executive Secretary Science
- Secretarial
- Office Occupations Cooperative Education
- Cooperative Work Training (CWT)
- Word Processing
- Hospitality (Travel and Travel Service)
- Clerical Occupations
- Office Occupations
- **All Bus., Market., and Mgmt. Occupations Programs**

Health Occupations
- Dental Assisting
- Practical Nursing
- Nurse Aide
- Health Care Aide
- Medical Assisting
- Health Aide
- Medical Records
- Health Occupations Cooperative Education
- Cooperative Work Training (CWT)
- Health Occupations
- **All Health Occupations Programs**

Home Economics Occs.
- Child Care
- Clothing Management, Production, and Service
- Food Management, Production, and Service
- Home Economics Cooperative Education
- Interior Decorating
- Child Development
- Cooperative Work Training (CWT)
- **All Home Economics Occupations Programs**

Industrial Occupations
- Air Conditioning
- Heating
- Appliance Repair
- Automotive Services
- Body and Fender Repair
- Auto Mechanics
- Aircraft Maintenance
- Commercial Art
- Construction and Building Trades
- Carpentry
- Industrial Maintenance
- Diesel Mechanic
- Drafting
- Electrical Occupations
- Industrial Electrician
- Electronic Occupations
- Radio/Television Repair
- Graphic Arts
- Machine Shop
- Combine Metal Trades
- Welding
- Tool and Die Making
- Cosmetology
- Refrigeration
- Small Engine Repair
- Millwork and Cabinet Making
- Industrial Cooperative Education
- Cooperative Work Training (CWT)
- Truck Driving
- Warehousing
- Home Remodeling and Renovation
- Custodial Maintenance
- Communications and Media Specialist
- **All Industrial Occupations Programs**

ALL VOCATIONAL TRAINING AREAS AND PROGRAMS

KEY

■ - High Generalizability ($\bar{X}$ = 5.01 - 7.00)

▨ - Medium Generalizability ($\bar{X}$ = 3.00 - 5.00)

☐ - Low Generalizability ($\bar{X}$ = 1.00 - 2.99)

Mixed Operations

18. Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, common fractions or mixed numbers to decimal fractions, and decimal fractions to common fractions or mixed numbers
19. Solve word problems by selecting and using correct order of operations
20. Perform written calculations quickly
21. Compute averages

Measurement and Calculation

22. Read numbers or symbols from time, weight, distance, and volume measuring scales
23. Use a measuring device to determine an object's weight, distance, or volume in standard (English) units
24. Use a measuring device to determine an object's weight, distance, or volume in metric units
25. Perform basic metric conversions involving weight, distance, and volume
26. Solve problems involving time, weight, distance, and volume
27. Use a calculator to perform basic arithmetic operations to solve problems

Estimation

28. Determine if a solution to a mathematical problem is reasonable

Vocational Training Areas and Programs

Agricultural Occs.
- Agricultural Mechanics
- Ornamental Horticulture
- Agricultural Cooperative Education
- Conservation
- Cooperative Work Training (CWT)
- **All Agricultural Occupations Programs**

Business, Marketing and Management Occs.
- Advertising Services
- General Merchandise (Sales)
- Personal Services (Sales)
- Marketing Cooperative (D.E.)
- Accounting and Computing Occupations
- Business Data Processing Systems
- Computer Programming
- Filing, Office Machines
- General Office Clerking
- Executive Secretary Science
- Secretarial
- Office Occupations Cooperative Education
- Cooperative Work Training (CWT)
- Word Processing
- Hospitality (Travel and Travel Service)
- Clerical Occupations
- Office Occupations
- **All Bus., Market., and Mgmt. Occupations Programs**

Health Occupations
- Dental Assisting
- Practical Nursing
- Nurse Aide
- Health Care Aide
- Medical Assisting
- Health Aide
- Medical Records
- Health Occupations Cooperative Education
- Cooperative Work Training (CWT)
- Health Occupations
- **All Health Occupations Programs**

Home Economics Occs.
- Child Care
- Clothing Management, Production, and Service
- Food Management, Production, and Service
- Home Economics Cooperative Education
- Interior Decorating
- Child Development
- Cooperative Work Training (CWT)
- **All Home Economics Occupations Programs**

Industrial Occupations
- Air Conditioning
- Heating
- Appliance Repair
- Automotive Services
- Body and Fender Repair
- Auto Mechanics
- Aircraft Maintenance
- Commercial Art
- Construction and Building Trades
- Carpentry
- Industrial Maintenance
- Diesel Mechanic
- Drafting
- Electrical Occupations
- Industrial Electrician
- Electronic Occupations
- Radio/Television Repair
- Graphic Arts
- Machine Shop
- Combine Metal Trades
- Welding
- Tool and Die Making
- Cosmetology
- Refrigeration
- Small Engine Repair
- Millwork and Cabinet Making
- Industrial Cooperative Education
- Cooperative Work Training (CWT)
- Truck Driving
- Warehousing
- Home Remodeling and Renovation
- Custodial Maintenance
- Communications and Media Specialist
- **All Industrial Occupations Programs**

ALL VOCATIONAL TRAINING AREAS AND PROGRAMS

Appendix B

Additional Important Mathematics Skills

Business, Marketing, and Management Occupations Programs

Program	Skill
Advertising Services General Merchandise (Sales)	• Calculate discounts and use them in problems
Business Data Processing Systems Computer Programming	• Use of base 2 and 16 arithmetic • Understand algebraic concepts • Provide proof of results obtained
Secretarial	• Use touch-method of using calculator • Accuracy and speed in using calculator
Office Occupations	• Verify answers

Health Occupations Programs

Program	Skill
Practical Nursing	• Read a centigrade thermometer and convert to Fahrenheit • Solve word problems using measurements based on apothecaries' and household measurements • Solve ratio and proportion problems • Use complex metrics and apothecaries' systems

Industrial Occupations Programs

Mathematics

Program	Skill
Air Conditioning Heating Refrigeration Electronics Occupations Machine Shop Tool and Die Making	• Use basic trigonometric functions
Auto Mechanics	• Apply degrees of rotation to a graph
Commercial Art	• Enlarge or reduce proportional sizes
Diesel Mechanics	• Convert pounds to foot pounds and foot pounds to pounds
Electrical Occupations Electronics Occupations	• Find square root • Use binary math • Use scientific notation • Use algebraic equations and formulas for solving unknowns • Use a measuring device to measure electronic quantities
Air Conditioning Combine Metal Trades Machine Shop Welding	• Use basic geometry (e.g., area, circumference, volume)
Machine Shop Tool and Die Making Industrial Electrician Electronics Occupations Electrical Occupations	• Use algebra
Electronics Occupations Electrical Occupations	• Check answers for accuracy • Find formulas to solve problems

Appendix C

Student Self-Ratings

GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT

Student Self-Ratings

Directions: In the spaces provided, write your name, write your teacher's name, write the name of your school, check (✓) your vocational program area, and write the name of your vocational program.

Student Name: ____________________

Teacher Name: ____________________

School: ____________________

Vocational Program Area/Program:

____ Agricultural Occupations: ____________________

____ Business, Marketing, and Management Occupations: ____________________

____ Health Occupations: ____________________

____ Home Economics Occupations: ____________________

____ Industrial Occupations: ____________________

TURN PAGE

Mathematics Skills	Degree of Skill			
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
3. Multiply and divide whole numbers examples: Multiply: $\begin{array}{r}80\\ \times\ 3\\ \hline\end{array}$ $\begin{array}{r}543\\ \times\ 81\\ \hline\end{array}$ Divide: $7\overline{)147}$ $125\overline{)34,318}$	1	2	3	4
4. Add, subtract, multiply, and divide whole numbers to solve word problems	1	2	3	4
5. Round off whole numbers	1	2	3	4
FRACTIONS				
6. Read and write common fractions examples: $\frac{1}{8}$, one-eighth $\frac{5}{4}$, five-fourths $3\frac{6}{7}$, three and six-sevenths	1	2	3	4

TURN PAGE

Directions: Indicate, by circling the number, how well you believe you can do ***each*** *of the following mathematics skills.*

Example:

Mathematics Skill	Degree of Skill Cannot Do	 Cannot Do Too Well	 Can Do Fairly Well	 Can Do Well
Read and write common fractions	1	2	[✓ 3]	4

Mathematics Skills	Degree of Skill Cannot Do	 Cannot Do Too Well	 Can Do Fairly Well	 Can Do Well
WHOLE NUMBERS				
1. Read, write, and count whole numbers examples: 6, six 54, fifty-four 375, three hundred seventy-five 4,128; four thousand one hundred twenty-eight	1	2	3	4
2. Add and subtract whole numbers examples: Add: $\begin{array}{r} 8 \\ \underline{+3} \end{array}$ $\begin{array}{r} 15,821 \\ 3,147 \\ \underline{+\ \ 195} \end{array}$ Subtract: $\begin{array}{r} 76 \\ \underline{-23} \end{array}$ $\begin{array}{r} 12,872 \\ \underline{-\ \ \ 983} \end{array}$	1	2	3	4

TURN PAGE

Mathematics Skills	Degree of Skill			
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
7. Add and subtract common fractions __examples__: Add: $\begin{array}{r}\frac{2}{5}\\ +\frac{1}{5}\\ \hline\end{array}$ $\begin{array}{r}\frac{5}{8}\\ +\frac{1}{3}\\ \hline\end{array}$ $\begin{array}{r}10\frac{1}{2}\\ +\ 4\frac{1}{4}\\ \hline\end{array}$ Subtract: $\begin{array}{r}\frac{6}{7}\\ -\frac{3}{7}\\ \hline\end{array}$ $\begin{array}{r}\frac{5}{9}\\ -\frac{1}{3}\\ \hline\end{array}$ $\begin{array}{r}18\frac{2}{3}\\ -15\frac{1}{6}\\ \hline\end{array}$	1	2	3	4
8. Multiply and divide common fractions __examples__: Multiply: $\frac{1}{2} \times \frac{1}{3}$ $\frac{5}{9} \times \frac{3}{15}$ $\begin{array}{r}12\\ \times\ 4\frac{3}{5}\\ \hline\end{array}$ Divide: $\frac{3}{8} \div \frac{9}{10}$ $\frac{2}{3} \div 4$ $\dfrac{9\frac{7}{15}}{4\frac{2}{5}}$	1	2	3	4
9. Add, subtract, multiply, and divide common fractions to solve word problems	1	2	3	4

TURN PAGE

Mathematics Skills	Degree of Skill			
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
DECIMALS				
10. Read and write decimals examples: .2, two-tenths .43, forty-three hundredths .875, eight hundred seventy-five thousandths .0964, nine hundred sixty-four ten thousandths	1	2	3	4
11. Add and subtract decimals examples: Add: $\begin{array}{r} .3 \\ .1 \\ \underline{+.2} \end{array}$ 125.2 + 38.3 + 16.8 .00789 + .00023 Subtract: $\begin{array}{r} .7 \\ \underline{-.2} \end{array}$ 320.8 - 18.6 124 - .009	1	2	3	4

TURN PAGE

Mathematics Skills	Degree of Skill Cannot Do	 Cannot Do Too Well	 Can Do Fairly Well	 Can Do Well
12. Multiply and divide decimals examples: Multiply: $\begin{array}{r} .6 \\ \underline{\times 3} \end{array}$ $\begin{array}{r} 110 \\ \underline{\times .854} \end{array}$ 1,425 x 7.63 Divide: $15/\overline{8.70}$ $75.2/\overline{128.764}$ 8 ÷ .004	1	2	3	4
13. Add, subtract, multiply, and divide common decimals to solve word problems	1	2	3	4
14. Solve problems involving dollars and cents	1	2	3	4
15. Round off decimals	1	2	3	4

TURN PAGE

Mathematics Skills	Degree of Skill			
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
PERCENT				
16. Read and write percents __examples__: 32%, thirty-two percent $8\frac{1}{3}$%, eight and one-third percent 115.6%, one hundred fifteen and six-tenths percent	1	2	3	4
17. Solve problems involving percents	1	2	3	4
MIXED OPERATIONS				
18. Change fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, fractions or mixed numbers to decimal fractions, decimal fractions to fractions or mixed numbers	1	2	3	4
19. Solve word problems by selecting and using the correct order of addition, subtraction, multiplication, and division for whole numbers, fractions, decimals, and percents	1	2	3	4

TURN PAGE

Mathematics Skills	Degree of Skill			
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
20. Find averages (means)	1	2	3	4
21. Do written calculations quickly	1	2	3	4

MEASUREMENT AND CALCULATION

22. Read numbers or symbols from time, weight, distance, and volume measuring scales	1	2	3	4
23. Use measuring scales to determine an object's weight, distance, and volume in standard (English) units	1	2	3	4
24. Use measuring scales to determine an object's weight, distance, and volume in metric units	1	2	3	4
25. Do basic metric conversions involving weight, distance, and volume	1	2	3	4
26. Solve problems involving time, weight, distance, and volume	1	2	3	4
27. Use a calculator to solve problems involving addition, subtraction, multiplication, and division	1	2	3	4

TURN PAGE

Mathematics Skills	Degree of Skill			
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
ESTIMATION				
28. Determine if a solution or answer to a mathematics problem is reasonable	1	2	3	4

In the following spaces, you may write comments about your mathematics skills:

STOP, YOU ARE FINISHED

GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT
STUDENT SELF-RATINGS
SKILL PROFILE

Scales/Skills	Item Number	Student Self-Rating
WHOLE NUMBERS		
read, write, and count	1	____
add and subtract	2	____
multiply and divide	3	____
solve word problems	4	____
round off	5	____
		Total ______
FRACTIONS		Average(/5) ____
read and write	6	____
add and subtract	7	____
multiply and divide	8	____
solve word problems	9	____
		Total ______
DECIMALS		Average(/4) ____
read and write	10	____
add and subtract	11	____
multiply and divide	12	____
solve word problems	13	____
solve dollars and cents problems	14	____
round off	15	____
		Total ______
PERCENT		Average(/6) ____
read and write	16	____
solve problems	17	____
		Total ______
MIXED OPERATIONS		Average(/2) ____
change fractions, decimals, percents, mixed numbers, and decimal fractions	18	____
solve word problems	19	____
find averages	20	____
do written calculations quickly	21	____
		Total ______
MEASUREMENT AND CALCULATION		Average(/4) ____
read time, weight, distance, and volume scales	22	____
use standard weight, distance, and volume scales	23	____
use metric weight, distance, and volume scales	24	____
do basic metric weight, distance, and volume conversions	25	____
solve time, weight, distance, and volume word problems	26	____
use a calculator to solve addition, subtraction, multiplication, and division problems	27	____
		Total ______
ESTIMATION		Average(/6) ____
determine if a solution or answer to a mathematics problem is reasonable	28	Total ______
		TOTAL ____
		AVERAGE (/28) ____

OVER

Comments:

Appendix D

Teacher Ratings

GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT

Teacher Ratings

Directions: In the spaces provided, write your name, write your teacher's name, write the name of your school, check (√) your vocational program area, and write the name of your vocational program.

Student Name: ______________________________

Teacher Name: ______________________________

School: ______________________________

Vocational Program Area/Program:

____ Agricultural Occupations: ______________________________

____ Business, Marketing, and Management Occupations: ______________________________

____ Health Occupations: ______________________________

____ Home Economics Occupations: ______________________________

____ Industrial Occupations: ______________________________

TURN PAGE

Directions: Indicate, by circling the number, how well you believe the student named on the cover sheet can do each of the following mathematics skills.

Example:

Mathematics Skill	Degree of Skill: Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
Read and write common fractions	1	2	[✓ 3]	4

Mathematics Skills	Degree of Skill: Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
WHOLE NUMBERS				
1. Read, write, and count whole numbers examples: 6, six 54, fifty-four 375, three hundred seventy-five 4,128; four thousand one hundred twenty-eight	1	2	3	4
2. Add and subtract whole numbers examples: Add: $\begin{array}{r}8\\+3\\\hline\end{array}$ $\begin{array}{r}15{,}821\\3{,}147\\+\ 195\\\hline\end{array}$ Subtract: $\begin{array}{r}76\\-23\\\hline\end{array}$ $\begin{array}{r}12{,}872\\-\ \ 983\\\hline\end{array}$	1	2	3	4

TURN PAGE

Mathematics Skills	Degree of Skill			
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
3. Multiply and divide whole numbers examples: Multiply: $\begin{array}{r}80\\ \times\ 3\\ \hline\end{array}$ $\begin{array}{r}543\\ \times\ 81\\ \hline\end{array}$ Divide: $7\overline{)147}$ $125\overline{)34{,}318}$	1	2	3	4
4. Add, subtract, multiply, and divide whole numbers to solve word problems	1	2	3	4
5. Round off whole numbers	1	2	3	4
FRACTIONS				
6. Read and write common fractions examples: $\frac{1}{8}$, one-eighth $\frac{5}{4}$, five-fourths $3\frac{6}{7}$, three and six-sevenths	1	2	3	4

TURN PAGE

Mathematics Skills	Degree of Skill			
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
7. Add and subtract common fractions __examples__: Add: $\frac{2}{5} + \frac{1}{5}$ $\frac{5}{8} + \frac{1}{3}$ $10\frac{1}{2} + 4\frac{1}{4}$ Subtract: $\frac{6}{7} - \frac{3}{7}$ $\frac{5}{9} - \frac{1}{3}$ $18\frac{2}{3} - 15\frac{1}{6}$	1	2	3	4
8. Multiply and divide common fractions __examples__: Multiply: $\frac{1}{2} \times \frac{1}{3}$ $\frac{5}{9} \times \frac{3}{15}$ $12 \times 4\frac{3}{5}$ Divide: $\frac{3}{8} \div \frac{9}{10}$ $\frac{2}{3} \div 4$ $\dfrac{9\frac{7}{15}}{4\frac{2}{5}}$	1	2	3	4
9. Add, subtract, multiply, and divide common fractions to solve word problems	1	2	3	4

TURN PAGE

Mathematics Skills	Degree of Skill			
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
DECIMALS				
10. Read and write decimals examples: .2, two-tenths .43, forty-three hundredths .875, eight hundred seventy-five thousandths .0964, nine hundred sixty-four ten thousandths	1	2	3	4
11. Add and subtract decimals examples: Add: $\begin{array}{r} .3 \\ .1 \\ \underline{+.2} \end{array}$ 125.2 + 38.3 + 16.8 .00789 + .00023 Subtract: $\begin{array}{r} .7 \\ \underline{-.2} \end{array}$ 320.8 - 18.6 124 - .009	1	2	3	4

TURN PAGE

Mathematics Skills	Degree of Skill			
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
12. Multiply and divide decimals				
examples:				
Multiply: $\begin{array}{r} .6 \\ \underline{\times 3} \end{array}$ $\begin{array}{r} 110 \\ \underline{\times .854} \end{array}$ 1,425 × 7.63				
Divide: $15/\overline{8.70}$ $75.2/\overline{128.764}$ 8 ÷ .004	1	2	3	4
13. Add, subtract, multiply, and divide common decimals to solve word problems	1	2	3	4
14. Solve problems involving dollars and cents	1	2	3	4
15. Round off decimals	1	2	3	4

TURN PAGE

Mathematics Skills	Degree of Skill			
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
PERCENT				
16. Read and write percents examples: 32%, thirty-two percent $8\frac{1}{3}$%, eight and one-third percent 115.6%, one hundred fifteen and six-tenths percent	1	2	3	4
17. Solve problems involving percents	1	2	3	4
MIXED OPERATIONS				
18. Change fractions to decimals, percents to fractions, fractions to percents, percents to decimals, decimals to percents, fractions or mixed numbers to decimal fractions, decimal fractions to fractions or mixed numbers	1	2	3	4
19. Solve word problems by selecting and using the correct order of addition, subtraction, multiplication, and division for whole numbers, fractions, decimals, and percents	1	2	3	4

TURN PAGE

Mathematics Skills	Degree of Skill			
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
20. Find averages (means)	1	2	3	4
21. Do written calculations quickly	1	2	3	4
MEASUREMENT AND CALCULATION				
22. Read numbers or symbols from time, weight, distance, and volume measuring scales	1	2	3	4
23. Use measuring scales to determine an object's weight, distance, and volume in standard (English) units	1	2	3	4
24. Use measuring scales to determine an object's weight, distance, and volume in metric units	1	2	3	4
25. Do basic metric conversions involving weight, distance, and volume	1	2	3	4
26. Solve problems involving time, weight, distance, and volume	1	2	3	4
27. Use a calculator to solve problems involving addition, subtraction, multiplication, and division	1	2	3	4

TURN PAGE

Mathematics Skills	Degree of Skill			
	Cannot Do	Cannot Do Too Well	Can Do Fairly Well	Can Do Well
ESTIMATION				
28. Determine if a solution or answer to a mathematics problem is reasonable	1	2	3	4

In the following spaces, you may write comments about this student's mathematics skills:

STOP, YOU ARE FINISHED

GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT
TEACHER RATINGS
SKILL PROFILE

Scales/Skills	Item Number	Teacher Rating
WHOLE NUMBERS		
read, write, and count	1	____
add and subtract	2	____
multiply and divide	3	____
solve word problems	4	____
round off	5	____
		Total ________
		Average(/5) ____
FRACTIONS		
read and write	6	____
add and subtract	7	____
multiply and divide	8	____
solve word problems	9	____
		Total ________
		Average(/4) ____
DECIMALS		
read and write	10	____
add and subtract	11	____
multiply and divide	12	____
solve word problems	13	____
solve dollars and cents problems	14	____
round off	15	____
		Total ________
		Average(/6) ____
PERCENT		
read and write	16	____
solve problems	17	____
		Total ________
		Average(/2) ____
MIXED OPERATIONS		
change fractions, decimals, percents, mixed numbers, and decimal fractions	18	____
solve word problems	19	____
find averages	20	____
do written calculations quickly	21	____
		Total ________
		Average(/4) ____
MEASUREMENT AND CALCULATION		
read time, weight, distance, and volume scales	22	____
use standard weight, distance, and volume scales	23	____
use metric weight, distance, and volume scales	24	____
do basic metric weight, distance, and volume conversions	25	____
solve time, weight, distance, and volume word problems	26	____
use a calculator to solve addition, subtraction, multiplication, and division problems	27	____
		Total ________
		Average(/6) ____
ESTIMATION		
determine if a solution or answer to a mathematics problem is reasonable	28	Total ________
		TOTAL ____
		AVERAGE (/28) ____

OVER

Comments:

Appendix E

Performance Test

GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT

Performance Test

Directions: In the spaces provided, write your name, write your teacher's name, write the name of your school, check (√) your vocational program area, and write the name of your vocational program.

Student Name: ______________________________

Teacher Name: ______________________________

School: ______________________________

Vocational Program Area/Program:

____ Agricultural Occupations: ______________________________
____ Business, Marketing, and Management Occupations: ______________________________
____ Health Occupations: ______________________________
____ Home Economics Occupations: ______________________________
____ Industrial Occupations: ______________________________

TURN PAGE

Directions; *Do* ***each*** *of the following problems by circling the correct answer. Please use the scratch paper provided to work out your answers.*

Example:

Add: $\begin{array}{r} 8 \\ \underline{+7} \end{array}$

(a) 6 (b) 25 [✓ (c) 15] (d) 5

WHOLE NUMBERS

1. 97 is written as:

   (a) nine hundred seven

   (b) nine thousand seventy

   (c) ninety-seven

   (d) seventy-nine

2. 4,132 is written as:

   (a) four thousand one hundred thirty-two

   (b) forty-one thousand thirty-two

   (c) forty-one hundred thirty

   (d) four hundred thirty-two

TURN PAGE

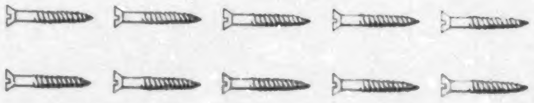
3. Eight is represented by which number?

(a) 8 (b) 6 (c) 800 (d) 80

4. Five thousand nine hundred nineteen is represented by which number?

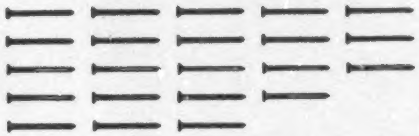
(a) 519 (b) 59 (c) 591 (d) 5,919

5. How many screws are there in the following diagram?



(a) 10 (b) 30 (c) 8 (d) 5

6. How many nails are there in the following diagram?



(a) 13 (b) 22 (c) 15 (d) 32

7. Add:

$$\begin{array}{r} 9 \\ +7 \\ \hline \end{array}$$

(a) 26 (b) 2 (c) 16 (d) 17

8. Add:

$$\begin{array}{r} 302 \\ 431 \\ +\ 58 \\ \hline \end{array}$$

(a) 791 (b) 792 (c) 691 (d) none of these

TURN PAGE

9. **Add:**

$$\begin{array}{r} 12,031 \\ 1,224 \\ 8,341 \\ \underline{+ \quad 489} \end{array}$$

(a) 22,985 (b) 22,085 (c) 21,085 (d) 22,075

10. **Subtract:**

$$\begin{array}{r} 98 \\ \underline{-27} \end{array}$$

(a) 61 (b) 81 (c) 125 (d) 71

11. **Subtract:**

$$\begin{array}{r} 926 \\ \underline{-336} \end{array}$$

(a) 590 (b) 690 (c) 592 (d) 692

12. **Subtract:**

$$\begin{array}{r} 13,104 \\ \underline{- \quad 785} \end{array}$$

(a) 13,319 (b) 13,621 (c) 12,329 (d) none of these

13. **Multiply:**

$$\begin{array}{r} 37 \\ \underline{\times 8} \end{array}$$

(a) 276 (b) 296 (c) 306 (d) 302

14. **Multiply:**

$$\begin{array}{r} 40 \\ \underline{\times 29} \end{array}$$

(a) 1,160 (b) 1,189 (c) 1,260 (d) 1,060

TURN PAGE

15. Multiply: $\begin{array}{r} 789 \\ \times\ 46 \\ \hline \end{array}$

(a) 35,294 (b) 37,284 (c) 7,890 (d) 36,294

16. Divide:

$8\overline{)224}$

(a) 30 (b) 26 (c) 28 (d) 27

17. Divide:

$27\overline{)3,321}$

(a) 13 (b) 132 (c) 1,230 (d) none of these

18. Divide:

$326\overline{)44,018}$

(a) 135 (c) 105 R=148

(b) 135 R=8 (d) 135 R=80

19. Mr. Jones has 9 acres of farm land. He intends to buy 6 acres in the spring, 15 in the summer and 48 in the fall. How many acres will he have at the beginning of next Winter?

(a) 30 (b) 68 (c) 58 (d) 78

TURN PAGE

20. Ms. Smith typed 126 pages on Wednesday. On Thursday she typed 58 pages. How many more pages did Ms. Smith type on Wednesday than on Thursday?

(a) 68 (b) 184 (c) 78 (d) 168

21. Sixteen ounces of flour were called for in a recipe. If the recipe were doubled, how many ounces of flour would be needed?

(a) 16 (b) 28 (c) 32 (d) none of these

22. How many 3-feet square sections can be cut from a piece of sheet metal 3-feet wide by 30 feet long?

(a) 90 (b) 10 (c) 33 (d) 8

23. 64 rounded off to the nearest tens place is:

(a) 60 (b) 70 (c) 65 (d) 80

24. 1,553 rounded off to the nearest hundreds place is:

(a) 1,500 (b) 1,550 (c) 1,600 (d) 2,000

25. 23,974 rounded off the to the nearest thousands place is:

(a) 23,900 (b) 23,000 (c) 24,900 (d) 24,000

TURN PAGE

FRACTIONS

26. $\frac{1}{4}$ is written as:

(a) one-eighth (c) one-fourteenth

(b) one-fourth (d) one-fortieth

27. $\frac{7}{3}$ is written as:

(a) three-seventieths (c) three-sevenths

(b) seventy-thirds (d) seven-thirds

28. $2\frac{5}{8}$ is written as:

(a) twenty-five eighths (c) two and five-eighths

(b) two and eight-fifths (d) twenty-eight fifths

29. Four-fifths is written as:

(a) $\frac{4}{5}$ (b) $\frac{4}{50}$ (c) $\frac{5}{4}$ (d) none of these

30. Nine-sixths is written as:

(a) $\frac{6}{9}$ (b) $\frac{9}{6}$ (c) $\frac{90}{6}$ (d) $\frac{96}{6}$

TURN PAGE

31. Four and eleven-eighteenths is written as:

(a) $\frac{411}{18}$ (b) $\frac{4}{1118}$ (c) $4\frac{11}{18}$ (d) $4\frac{11}{8}$

32. Add:

$$\begin{array}{r} \frac{5}{8} \\ +\frac{2}{8} \\ \hline \end{array}$$

(a) $\frac{3}{8}$ (b) $\frac{5}{8}$ (c) $\frac{7}{8}$ (d) $\frac{7}{16}$

33. Add:

$$\begin{array}{r} \frac{4}{6} \\ +\frac{2}{6} \\ \hline \end{array}$$

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) 6 (d) 1

34. Add:

$$\begin{array}{r} \frac{3}{4} \\ +\frac{1}{8} \\ \hline \end{array}$$

(a) $\frac{7}{8}$ (b) $\frac{1}{2}$ (c) $\frac{3}{8}$ (d) $\frac{1}{3}$

35. Add:

$$\begin{array}{r} \frac{1}{15} \\ +\frac{5}{6} \\ \hline \end{array}$$

(a) $\frac{7}{10}$ (b) $\frac{29}{30}$ (c) $\frac{23}{30}$ (d) none of these

TURN PAGE

36. **Add:**

$$\begin{array}{r} \frac{9}{10} \\ +\frac{7}{25} \\ \hline \end{array}$$

(a) $\frac{19}{50}$ (b) $1\frac{9}{50}$ (c) $\frac{9}{50}$ (d) $\frac{16}{35}$

37. **Add:**

$$\begin{array}{r} 12\frac{7}{8} \\ +\ 5\frac{1}{6} \\ \hline \end{array}$$

(a) $17\frac{3}{24}$ (b) $17\frac{1}{24}$ (c) $18\frac{1}{24}$ (d) $17\frac{5}{24}$

38. **Subtract:**

$$\begin{array}{r} \frac{8}{9} \\ -\frac{3}{9} \\ \hline \end{array}$$

(a) 5 (b) $\frac{11}{9}$ (c) $\frac{4}{9}$ (d) $\frac{5}{9}$

39. **Subtract:**

$$\begin{array}{r} \frac{5}{6} \\ -\frac{3}{6} \\ \hline \end{array}$$

(a) 2 (b) $\frac{1}{3}$ (c) $\frac{11}{6}$ (d) $\frac{1}{6}$

TURN PAGE

40. Subtract: $\frac{8}{9}$

$-\frac{2}{3}$

(a) $\frac{4}{9}$ (b) $\frac{1}{3}$ (c) $\frac{2}{9}$ (d) 6

41. Subtract: $10\frac{1}{12}$

$- 4$

(a) $5\frac{11}{12}$ (b) 6 (c) $5\frac{1}{2}$ (d) $6\frac{1}{12}$

42. Subtract: $16\frac{7}{10}$

$-12\frac{2}{9}$

(a) $4\frac{1}{2}$ (b) $4\frac{43}{90}$ (c) $4\frac{44}{90}$ (d) none of these

43. Subtract: $34\frac{1}{10}$

$-12\frac{4}{15}$

(a) $21\frac{5}{6}$ (b) $20\frac{5}{6}$ (c) $20\frac{1}{6}$ (d) $21\frac{1}{6}$

44. Multiply: $\frac{1}{4} \times \frac{1}{8}$

(a) $\frac{1}{22}$ (b) $\frac{1}{12}$ (c) $\frac{1}{32}$ (d) $1\frac{1}{2}$

TURN PAGE

45. Multiply: $\frac{2}{5} \times \frac{4}{7}$

(a) $\frac{1}{2}$ (b) $\frac{6}{35}$ (c) $\frac{6}{7}$ (d) $\frac{8}{35}$

46. Multiply: $\frac{5}{21} \times \frac{3}{35}$

(a) $\frac{1}{7}$ (b) $\frac{8}{56}$ (c) $\frac{1}{49}$ (d) none of these

47. Multiply: $8\frac{1}{6} \times 4\frac{2}{7}$

(a) $32\frac{1}{21}$ (b) 35 (c) $5\frac{5}{6}$ (d) $4\frac{2}{7}$

48. Multiply: $\frac{3}{4} \times \frac{4}{9} \times \frac{6}{7}$

(a) $\frac{2}{7}$ (b) $\frac{13}{20}$ (c) $\frac{3}{14}$ (d) $\frac{1}{14}$

49. Multiply:

$$\begin{array}{r} 48 \\ \times\ 3\frac{3}{4} \\ \hline \end{array}$$

(a) $1{,}443\frac{3}{4}$ (b) 144 (c) 180 (d) $144\frac{3}{4}$

50. Divide: $\frac{5}{8} \div \frac{1}{4}$

(a) $\frac{2}{5}$ (b) $2\frac{1}{2}$ (c) $\frac{5}{32}$ (d) $5\frac{3}{5}$

51. Divide: $\frac{3}{5} \div \frac{1}{10}$

(a) 6 (b) $\frac{3}{50}$ (c) $\frac{1}{3}$ (d) none of these

52. Divide: $\frac{5}{6} \div 2$

(a) $1\frac{2}{3}$ (b) $\frac{3}{5}$ (c) $2\frac{5}{6}$ (d) $\frac{5}{12}$

53. Divide: $3\frac{1}{3} \div 2\frac{1}{2}$

(a) $8\frac{1}{3}$ (b) $1\frac{1}{3}$ (c) $6\frac{1}{6}$ (d) $5\frac{2}{5}$

54. Divide: $\dfrac{\frac{3}{10}}{\frac{9}{10}}$

(a) $\frac{1}{9}$ (b) 9 (c) $\frac{9}{100}$ (d) $\frac{1}{3}$

55. Divide: $\dfrac{5\frac{1}{7}}{2\frac{1}{4}}$

(a) $2\frac{2}{7}$ (b) $11\frac{4}{7}$ (c) $10\frac{4}{7}$ (d) $7\frac{11}{28}$

TURN PAGE

56. A farmer removed 1/2 of all the corn in a silo and a week later removed 1/4 of the original amount of corn. What fractional part of the corn was removed from the silo?

(a) $\frac{1}{8}$ (b) $\frac{3}{4}$ (c) $\frac{1}{2}$ (d) $\frac{1}{4}$

57. A secretary typed an entire report on 5 3/4 pages. However, he/she was supposed to type the report on no more than 4 1/2 pages. How many extra pages did the secretary type?

(a) $2\frac{1}{2}$ (b) 1 (c) $10\frac{1}{4}$ (d) $1\frac{1}{4}$

58. A dress needing repair was sewn 3/4" up a seam. However, the repair should have been made 3 times that length. How many inches should the repair have been made?

(a) $2\frac{1}{4}$ (b) $\frac{1}{4}$ (c) 2 (d) 4

59. A worker has two pieces of sheet metal. How many quarters will he/she have if each piece is cut into equal sizes?

(a) 2 (b) 4 (c) 8 (d) 12

TURN PAGE

DECIMALS

60. .26 is written as:

    (a) twenty-six tenths

    (b) twenty-six hundredths

    (c) twenty-six thousandths

    (d) twenty-six

61. .0048 is written as:

    (a) forty-eight thousandths

    (b) forty-eight hundredths

    (c) forty-eight ten thousandths

    (d) four hundred and eighty

62. Seven-tenths is represented by which number?

    (a) .7 (b) .07 (c) .007 (d) 7

63. Ten ten thousandths is represented by which number?

    (a) 10,000 (b) .010 (c) .0001 (d) .0010

TURN PAGE

64. Add: $\begin{array}{r} .2 \\ .3 \\ \underline{+.4} \end{array}$

(a) .09 (b) .9 (c) 9 (d) .009

65. Add: $\begin{array}{r} .4 \\ .6 \\ \underline{+.9} \end{array}$

(a) 1.9 (b) 19 (c) .19 (d) .019

66. Add: $\begin{array}{r} 8.7 \\ 5.2 \\ \underline{+2.4} \end{array}$

(a) 15.13 (b) .163 (c) 1.63 (d) none of these

67. Add: 24 + 3.5 + .28

(a) 27.78 (b) 24.378 (c) 28 (d) 2.778

68. Add: 136.2 + 4.362 + 1.4 + .054

(a) 142.1016 (c) 142.016

(b) .00142016 (d) 136.8302

124

69. Add: .00826 + .001931

(a) .0010191 (c) .02757

(b) .010191 (d) .002757

70. Subtract: .8
-.3

(a) .5 (b) .05 (c) 5 (d) .24

71. Subtract: 9.2
-6.4

(a) 3.8 (b) 38 (c) 2.8 (d) .28

72. Subtract: 45.032
- 7.63

(a) 38.662 (b) 37.662 (c) 38.402 (d) 37.402

73. Subtract: 26 - 4.82

(a) 22.18 (b) 21.18 (c) 21.82 (d) none of these

74. Subtract: 498.3 - 4.983

(a) 0 (b) 492.317 (c) 493.317 (d) 493.1283

TURN PAGE

75. Subtract: 252 - .004

(a) 248 (b) 242.006 (c) 252.004 (d) 251.996

76. Multiply:

$$\begin{array}{r} .8 \\ \underline{\times\ 3} \end{array}$$

(a) 2.4 (b) .24 (c) 24 (d) .024

77. Multiply:

$$\begin{array}{r} 34.5 \\ \underline{\times\ \ .26} \end{array}$$

(a) .897 (b) 897 (c) 89.7 (d) 8.97

78. Multiply:

$$\begin{array}{r} 100 \\ \underline{\times .432} \end{array}$$

(a) .432 (b) 43.2 (c) 4.32 (d) .00432

79. Multiply: .25 x .25

(a) .0625 (b) .625 (c) 6.25 (d) none of these

80. Multiply: 18.2 x 3.64

(a) 662.48 (b) 6624.8 (c) 66.248 (d) .66248

81. Multiply: 1500 x 6.75

(a) 101.25 (b) .10125 (c) 10.125 (d) 10,125

82. **Divide:** $14/\overline{7.28}$

(a) 5.2 (b) 52 (c) .52 (d) .052

83. **Divide:** $4/\overline{.0024}$

(a) 6 (b) .006 (c) .6 (d) .0006

84. **Divide:** $6/\overline{3}$

(a) .5 (b) 50 (c) .05 (d) 5

85. **Divide:** $.25/\overline{1.6125}$

(a) 645 (b) 6.45 (c) .0645 (d) .00645

86. **Divide:** $86.8/\overline{140.616}$

(a) 1.62 (b) .162 (c) 16.2 (d) none of these

87. **Divide:** $.022 \div 4$

(a) .5 (b) .005 (c) .0055 (d) .05

TURN PAGE

88. Joe removed .5 of all the flowers from a box and Cindy removed .3 of the original number of flowers. What decimal part of the flowers was removed from the box?

(a) .2 (b) 8 (c) .8 (d) .08

89. Mr. Best sold .24 of the suits he wanted to sell at his clothing store one day. What decimal part of his suits still need to be sold?

(a) 76 (b) .76 (c) 7.6 (d) 24

90. A patient needs to take 2.75 ounces of medicine per day. After 5 days, how many ounces of medicine will the patient have taken?

(a) 13.75 (b) 1.375 (c) .1375 (d) 137.5

91. A carpenter has 1 board of lumber. If he/she cuts the board into 10 equal pieces, what decimal part would one piece be?

(a) .01 (b) 10 (c) 1 (d) .1

92. Add:

```
 $14.26
 $ 3.31
 $   .98
+$   .07
```

(a) $7.62 (b) $8.62 (c) $17.62 (d) $18.62

93. Celery seeds cost $.59 per pack, lettuce seeds cost $.54 per pack, and carrot seeds cost $.48 per pack. What is the cost if one of each pack of seeds is bought?

(a) $1.61 (b) $16.10 (c) $.16 (d) $2.61

TURN PAGE

94. Subtract: $24.31
-$ 5.42

(a) $29.73 (b) $18.89 (c) $28.89 (d) $19.73

95. Mrs. Perez paid for $15.26 worth of groceries with a twenty dollar bill. How much change should she receive?

(a) $5.74 (b) $5.84 (c) $4.74 (d) $4.84

96. Multiply: $24.99
× 3

(a) $74.97 (b) $749.07 (c) $.74 (d) $7.49

97. If paint costs $12.49 per gallon, how much would fourteen gallons cost?

(a) $124.90 (b) $17.48 (c) $49.96 (d) $174.86

98. Divide: 25/$2.00

(a) $80 (b) $8 (c) $.08 (d) $.80

99. Ten pounds of nails cost $12.40. How much would one pound cost?

(a) $1.24 (b) $.12 (c) $.24 (d) $22.40

TURN PAGE

100. .84 rounded off to the nearest tenths place is:

(a) .8 (b) .9 (c) .85 (d) .83

101. .9829 rounded off to the nearest thousandths place is:

(a) .982 (b) .983 (c) .9820 (d) .98

102. .00175 rounded off to the nearest ten thousandths place is:

(a) .0017 (b) .0020 (c) .00176 (d) .0018

TURN PAGE

PERCENT

103. 48% is written as:

(a) forty percent

(b) four hundred eighty percent

(c) forty-eight percent

(d) eighty-four percent

104. 125.5% is written as:

(a) one hundred twenty-five and five-tenths percent

(b) one thousand two hundred fifty-five percent

(c) twenty-five and five-tenths percent

(d) one hundred twenty-five percent

105. $9\frac{3}{4}$% is written as:

(a) ninety-three fourths percent

(b) nine and three-fourths percent

(c) nine and four-thirds percent

(d) ninety-four thirds percent

TURN PAGE

106. Seventy-five percent is represented by which of the following?

(a) 70% (b) 75% (c) 85% (d) 57%

107. Six and nine-tenths percent is represented by which of the following?

(a) $\frac{69}{10}$% (b) 6910% (c) 6.9% (d) none of these

108. One hundred fifty-six and one-half percent is represented by which of the following?

(a) $156\frac{1}{2}$% (b) 156.1% (c) 156% (d) 10056 $\frac{1}{2}$%

109. 8 is what percent of 32?

(a) 33% (b) 25% (c) 50% (d) 75%

110. 75% of 48 is:

(a) 12 (b) 24 (c) 36 (d) 48

111. 40 is 20% of what number?

(a) 60 (b) 100 (c) 20 (d) none of these

TURN PAGE

MIXED OPERATIONS

112. $\frac{4}{5}$ changed to a decimal is:

(a) 4%　(b) $\frac{1}{5}$　(c) .75　(d) .80

113. 30% changed to a fraction is:

(a) $\frac{3}{100}$　(b) $\frac{3}{10}$　(c) $\frac{1}{30}$　(d) .03

114. $\frac{5}{8}$ changed to a percent is:

(a) 62 $\frac{1}{2}$%　(b) 625%　(c) 6.2 $\frac{1}{2}$%　(d) none of these

115. 92% changed to a decimal is:

(a) .092　(b) 92　(c) 9.2　(d) .92

116. .023 changed to a percent is:

(a) 23%　(b) 23　(c) 2.3%　(d) .23%

117. $\frac{1}{2}$ changed to a decimal is:

(a) .50　(b) .05　(c) 50　(d) .2

TURN PAGE

118. $6\frac{3}{5}$ changed to a decimal is:

(a) .066 (b) 66 (c) .66 (d) none of these

119. .75 changed to a fraction is:

(a) $\frac{1}{4}$ (b) .50 (c) $\frac{3}{4}$ (d) $\frac{5}{7}$

120. 2.45 changed to a fraction is:

(a) $\frac{1}{245}$ (b) $2\frac{4}{5}$ (c) $2\frac{9}{20}$ (d) 24.5%

121. A machine produces 150 items per hour. If one morning run of four hours gave 24 defective items, what percent of items produced were defective?

(a) 4% (b) 16% (c) 6.25% (d) 2%

122. A farmer harvested 100 bushels of corn on Monday, 85 bushels on Tuesday, and 40 bushels on Wednesday. If he/she wants to harvest 300 bushels of corn by Thursday, what part of the corn still needs to be harvested?

(a) .75 (b) .25 (c) .50 (d) .10

123. If 1,000 bricks are needed to build a wall and only 650 are on the work site, what part of the bricks needed are available?

(a) $\frac{7}{10}$ (b) $\frac{13}{10}$ (c) $\frac{13}{20}$ (d) $\frac{7}{20}$

TURN PAGE

124. Find the average (mean) of the following numbers: 55, 31, 26, 48

(a) 35 (b) 160 (c) 40 (d) 80

125. Find the average (mean) of the following numbers: 12.1, 8.9, 16.5

(a) 12.5 (b) 13.5 (c) 11.5 (d) 14

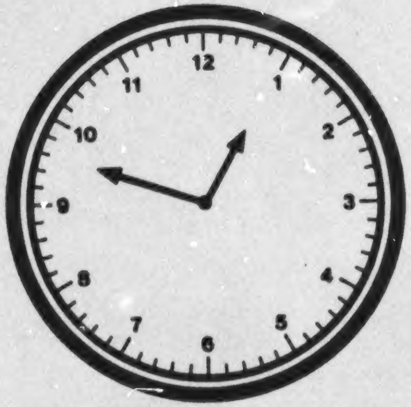
126. A salesperson sold $80.50 of clothing on Monday, $100.27 on Tuesday, $93.76 on Wednesday, $85.24 on Thursday, and $125.08 on Friday. What was his/her average sales per day?

(a) $76.97 (b) $96.97 (c) $116.97 (d) $93.76

TURN PAGE

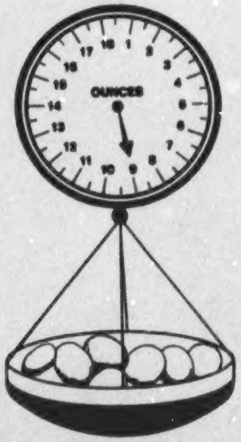
MEASUREMENT AND CALCULATION

127. What time is shown on the clock?


12
1
2
3
4
5
6
7
8
9
10
11

(a) 12:50 (b) 12:52 (c) 12:48 (d) 12:43

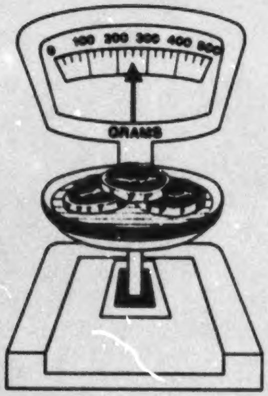
128. How much do the vegetables weigh?



(a) 9 ounces (b) 8 ounces (c) 10 ounces (d) 11 ounces

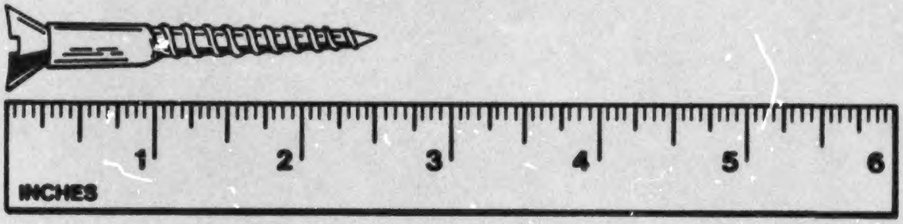
TURN PAGE

129. How much does the meat weigh?


0
100
200
300
400
500
GRAMS

(a) 200 grams (b) 300 grams (c) 225 grams (d) 250 grams

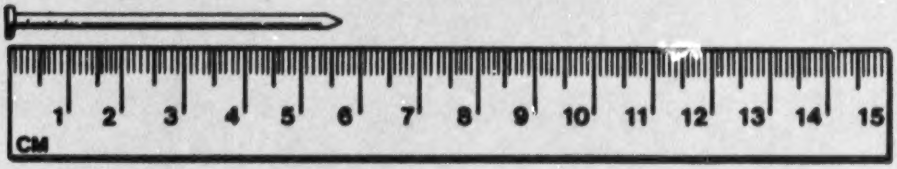
130. What is the length of the screw to the nearest quarter inch?


1
2
3
4
5
6
INCHES

(a) 2" (b) $2\frac{1''}{2}$ (c) $2\frac{3''}{4}$ (d) 3"

TURN PAGE

131. How long is the nail to the nearest tenth of a centimeter?


1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
CM

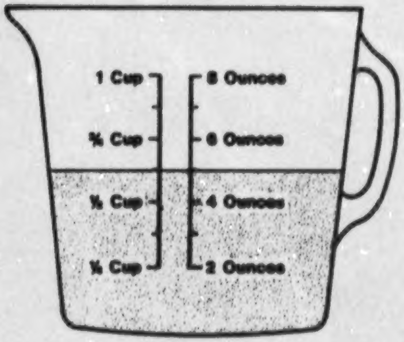
(a) 5.5 centimeters

(b) 5 centimeters

(c) 5.7 centimeters

(d) 6 centimeters

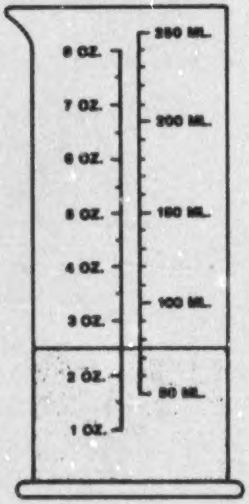
132. What is the volume of milk?


1 Cup
¾ Cup
½ Cup
¼ Cup
8 Ounces
6 Ounces
4 Ounces
2 Ounces

(a) 2 ounces (b) 3 ounces (c) 4 ounces (d) 5 ounces

TURN PAGE

133. What is the volume of water?


8 OZ.
7 OZ.
6 OZ.
5 OZ.
4 OZ.
3 OZ.
2 OZ.
1 OZ.
250 ML.
200 ML.
150 ML.
100 ML.
50 ML.

(a) 50 ml. (b) 75 mi. (c) 100 ml. (d) 200 ml.

134. .25 kilograms are equal to:

(a) $\frac{1}{250}$ gram

(b) 25 grams

(c) 2,500 grams

(d) 250 grams

135. 11 pounds are equal to:

(a) 5 kilograms

(b) 50 kilograms

(c) 50 grams

(d) 500 grams

TURN PAGE

136. 10 centimeters are equal to:

(a) 1 meter (b) .1 meter (c) .01 meter (d) none of these

137. 5 inches are equal to:

(a) 127 millimeters	(c) 10 millimeters
(b) .127 millimeters	(d) 127 centimeters

138. 2 liters are equal to:

(a) 2 milliliters	(c) 2,000 milliliters
(b) 20 milliliters	(d) 200 milliliters

139. 1.06 quarts are equal to:

(a) 4 milliliters	(c) 1 milliliter
(b) 4 liters	(d) 1 liter

140. A farmer began plowing a field at 5:35 a.m. He/she finished 13 hours and 8 minutes later. What time was it when the farmer finished plowing the field?

(a) 6:35 p.m.	(c) 5:35 p.m.
(b) 6:43 p.m.	(d) 6:35 a.m.

TURN PAGE

141. A customer bought 10 pounds of pork chops, 6 pounds 8 ounces of steak, 1 pound of bacon, and 4 pounds 15 ounces of chicken. How much meat did the customer buy?

(a) 21 pounds 7 ounces
(c) 44 pounds
(b) 23 pounds
(d) none of these

142. A patient weighs 100 kilograms, but needs to lose 25 kilograms. How much will the patient weigh when he/she loses the necessary weight?

(a) 125 kilograms
(c) 125 pounds
(b) 75 kilograms
(d) 100 kilograms

143. If one wall stud is 8 feet long and there are 12 studs in a wall, how many linear feet of lumber (assuming zero waste) will a carpenter need for all the studs in the wall?

(a) 20 feet (b) 56 feet (c) 96 feet (d) 106 feet

144. A piece of pipe is 12 meters long. If the pipe is cut into 4 equal pieces, what would be the length of each piece (assuming zero waste)?

(a) 8 meters
(c) 16 meters
(b) 3 meters
(d) none of these

TURN PAGE

145. A cook needs ten 8-ounce cartons of milk for a recipe. How many quarts of milk would be used?

(a) 80 quarts
(c) 5 quarts
(b) 10 quarts
(d) 2.5 quarts

146. After a car traveled 260 miles its tank was refilled with 10.4 liters of gasoline. How many miles per liter did the car get?

(a) 25 (b) 20 (c) 30 (d) 27

TURN PAGE

ESTIMATION

147. A secretary organized his/her work and determined that it will take 25 minutes to type letters, 2 hours to type a mailing list, 45 minutes to proofread a manuscript, and 1 1/2 hours to do file work. While none of the following answers is correct, which answer is a reasonable estimate of the time it will take to do the work?

(a) about 3 hours
(c) about 8 hours
(b) about 6 $\frac{1}{2}$ hours
(d) about 4 hours 45 minutes

148. A welder has 1 1/2 feet of welding rod but he/she needs 3 times that amount to complete a job. While none of the following answers is correct, which answer is a reasonable estimate of the amount of welding rod needed to complete the job?

(a) about 3 feet
(c) about 7 feet
(b) about 4 $\frac{3}{4}$ feet
(d) about 10 feet

149. On a given day a machine shop earns $480 and pays $183.50 in overhead costs. While none of the following answers is correct, which answer is a reasonable estimate of the profit made by the machine shop?

(a) about $250.50
(c) about $290.00
(b) about $663.50
(d) about $350.00

TURN PAGE

150. A child drank 451 milliliters of milk on Monday, 675 milliliters on Tuesday, and 524 milliliters on Wednesday. While none of the following answers is correct, which answer is a reasonable estimate of the average (mean) amount of milk the child drank per day?

(a) about 545 milliliters

(c) about 483 milliliters

(b) about 650 milliliters

(d) about 800 milliliters

STOP, YOU ARE FINISHED

GENERALIZABLE VOCATIONAL MATHEMATICS SKILLS ASSESSMENT
PERFORMANCE TEST
SKILL PROFILE

Scales/Skills	Item Number		Number Correct
WHOLE NUMBERS			
read, write, and count	1 to 6		____
add and subtract	7 to 12		____
multiply and divide	13 to 18		____
solve word problems	19 to 22		____
round off	23 to 25		____
		Total	________
FRACTIONS			
read and write	26 to 31		____
add and subtract	32 to 43		____
multiply and divide	44 to 55		____
solve word problems	56 to 59		____
		Total	________
DECIMALS			
read and write	60 to 63		____
add and subtract	64 to 75		____
multiply and divide	76 to 87		____
solve word problems	88 to 91		____
solve dollars and cents problems	92 to 99		____
round off	100 to 102		____
		Total	________
PERCENT			
read and write	103 to 108		____
solve problems	109 to 111		____
		Total	________
MIXED OPERATIONS			
fractions to decimals to percents, mixed numbers, and decimal fractions	112 to 120		____
solve word problems	121 to 123		____
find averages	124 to 126		____
		Total	________
MEASUREMENT AND CALCULATION			
read time, weight, distance, and volume scales	127 to 133		____
do metric weight, distance, and volume conversions	134 to 139		____
solve time, weight, distance, and volume word problems	140 to 146		____
		Total	________
ESTIMATION			
determine if a solution or answer to a mathematics problem is reasonable	147 to 150		____
		Total	________
		TOTAL Score	____

OVER

Comments:

Appendix F

Performance Test Answer Key

Performance Test Answer Key

1) c
2) a
3) a
4) d
5) a
6) b
7) c
8) a
9) b
10) d
11) a
12) d
13) b
14) a
15) d
16) c
17) d
18) b
19) d
20) a
21) c
22) b
23) a
24) c
25) d
26) b
27) d
28) c
29) a
30) b
31) c
32) c
33) d
34) a
35) d
36) b
37) c
38) d
39) b
40) c
41) d
42) b
43) a
44) c
45) d
46) c
47) b
48) a
49) c
50) b
51) a
52) d
53) b
54) d
55) a
56) b
57) d
58) a
59) c
60) b
61) c
62) a
63) d
64) b
65) a
66) d
67) a
68) c
69) b
70) a
71) c
72) d
73) b
74) c
75) d
76) a
77) d
78) b
79) a
80) c
81) d
82) c
83) d
84) a
85) b
86) a
87) c
88) c
89) b
90) a
91) d
92) d
93) a
94) b
95) c
96) a
97) d
98) c
99) a
100) a
101) b
102) d
103) c
104) a
105) b
106) b
107) c
108) a
109) b
110) c
111) d
112) d
113) b
114) a
115) d
116) c
117) a
118) d
119) c
120) c
121) a
122) b
123) c
124) c
125) a
126) b
127) c
128) a
129) d
130) b
131) c
132) d
133) b
134) d
135) a
136) b
137) a
138) c
139) d
140) b
141) d
142) b
143) c
144) b
145) d
146) a
147) d
148) b
149) c
150) a

Appendix G

Assessment of Untested Skills

There are four generalizable mathematics skills which are assessed using the Student Self-Ratings and Teacher Ratings but not assessed using the Performance Test. These skills include: (a) Mixed Operations, Skill #20-Perform written calculations quickly, (b) Measurement and Calculation, Skill #23-Use a measuring device to determine an object's weight, distance, or volume in standard (English) units, (c) Measurement and Calculation, Skill #24-Use a measuring device to determine an object's weight, distance, or volume in Metric units, and (d) Measurement and Calculation, Skill #27-Use a calculator to perform basic arithmetic operations to solve problems. These four skills are not assessed using the Performance Test because they are more appropriately assessed using actual "hands-on" procedures by using equipment, such as, measuring devices and calculators. When assessing these skills, teachers should use equipment and materials used in their courses or programs.